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* General studies, see also individual crops.

Plant Breeding Abstracts.

Vol. XIII, No. 1.

Part 1. Empire Section

STATISTICS 519

1. 519.24
519.271.3

KOSAMBI, D. D.

A test of significance for multiple observations.

Curr. Sci. 1942 : **11** : 271–74.

The z-test is here partially extended to samples drawn from a normally distributed population in $p > 2$ linearly independent variates.

The limiting case in which the number of variates increases beyond any limit is also considered. This method if accepted would extend analysis of variance to such material as electro cardiograms, cranial shapes and temperature curves. E. K. J.

2. 519.24:631.421

HOLME, R. V.

Corn microplots and their interpretation. An interim discussion.

J.A.S.T. Quart. 1941 : **5** : No. 2 : 3–8.

Describes a statistical method of surveying the fertilizer requirements of large fields by means of qualitative determinations of soil deficiencies based on average weight of 100 corn plants in microplots to which known weights of nitrogen, phosphate and potash have been added. E. K. J.

BREEDING 575

3. 575:633

ENGLEDOW, F. L.

Science and the land.

Chem. Ind., Lond. 1942 : **61** : 239–45.

In a general survey of current problems of agriculture, plant breeding is touched upon in its relation to other branches; the complexity of the plant breeder's task is illustrated by reference to quality in barley and tea and suitability for canning in a number of crops.

4. 575:633(41)

The Scottish Plant Breeding Station, Craigs House, Corstorphine, Edinburgh.

Trans. Highl. Agric. Soc. Scot. 1942 : **54** : 141–43.

The results of the work in progress described reflect some of the recent tendencies in plant breeding research as they bear on the problem of grassland improvement. By transferring the emphasis from persistency to productivity, greater use could be made of the varieties of the few species capable of high production.

5. 575:633(54)

Agriculture and animal husbandry in India 1938–1939.

Imp. Counc. Agric. Res., Delhi 1941 : Pp. 422.

Of the many interesting points presented in the report the following from the work on economic plants are selected as especially interesting to geneticists:—

Wheat.

In the F_4 generation of nine crosses selected for rust resistance studies 1702 out of 2640 plants were rust resistant.

Susceptibility was dominant in all F_1s of seven crosses tested for reaction to a mixture of all the physiological races of black rust in India.

Rice.

37 pure breeding mutants were isolated from X-ray treatment of GEB24 and Co4. Of the economic types one form GEB24 was a profusely tillering dwarf.

Potato.
The main work was devoted to breeding for disease resistance. Hybrid No. 6 *Solanum demissum* x *S. tuberosum* which proved immune to late blight epidemics in 1936–1938 was backcrossed to *S. tuberosum.*

Cotton.
A new member of the anthocyanin allelomorphic series was identified in the Madras type Tellapatty.
Partial asynapsis was found to be the cause of sterility in the Million Dollar mutant.
Gossypium trilobum and *G. armourianum* were found to be resistant to bollworm and *G. contextum* to black scales.

Sugar Cane.
Imperata, Bambusa and *Sorghum halepense* provided further extension of the plants to cross with sugar cane.
A correlation between early flowering and low chromosome number was found in *Saccharum spontaneum.* Among the F_2 generation of a fertile cross between *S. spontaneum* $2n = 112$ and *Erianthus ravennae* $2n = 20$ were two thick canes which had double the number of chromosomes of the F_1.

Coffee.
The F_1 of a cross between *Coffea arabica* and *C. robusta* produced non-viable pollen.

Oil Seeds.
1. Among new hybrids were several self-fertile forms of toria (*Brassica napus* var. *dichotoma*) and sarson (*B. campestris*). A triploid toria and an apetalous sarson were isolated.
2. Disease resistant forms have been isolated from F_5 cultures of crosses between susceptible Indian and resistant foreign varieties of linseed.
3. Crosses were made between early flowering dwarf coconuts and tall late flowering varieties of good yield.
4. In Safflowers, positive correlation was found between white florets and high yield.

Pigeon pea (*Cajanus indicus*).
A wilt resistant strain was isolated in Pusa. E. K. J.

GENETICS 575.1

6. DARLINGTON, C. D. 575.1:576.312
The substance of heredity.
Endeavour, Lond. 1942 : **1** : 102–05.

Recent work on the subject is reviewed and evidence is presented that the transmission of hereditary characters is ultimately a chemical process.

7. ROBINSON, R. 575.11.061.6
The red and blue colouring matters of plants.
Endeavour, Lond. 1942 : **1** : 92–100.

The paper contains a section on the genetics of flower colour.

8. JEAN, Y. 575.243:537.5
Production artificielle de mutations par irradiations. (**Artificial production of mutations by irradiation**).
La Bonne Terre, Canada 1941 : **22** : 171–86.

The author discusses the various types of radiations that may be used in producing artificial mutations, concluding that X-rays are the most efficacious; the different effects of irradiation and the factors affecting the frequency of mutation are also outlined.

CYTOLOGY 576.3

9. HANCOCK, B. L. 576.356.5
Cytological and ecological notes on some species of *Galium* L. em. Scop.
New Phytol. 1942 : **41** : 70–78.

There is some indication that ecological preferences correspond with cytological grouping. Thus the diploid grows in damp places which dry out in summer while the octoploid is found in the permanently damp zones, often bordering upon water.

10. DARLINGTON, C. D. 576.356.5:577.16
Vitamin C and chromosome number in *Rosa*.
Nature, Lond. 1942 : **150** : p. 404.
Figures are given for the ascorbic acid content of rose hips of 11 species. They indicate that genetic differences determining vitamin content, irrespective of chromosome number, distinguish species within the Caninae. At the same time they suggest that polyploidy goes with, and may in itself determine, an increase in vitamin content. H. W. H.

MICROSCOPIC TECHNIQUE 578.6

11. BHADURI, P. N. 578.6
Improved smear methods for rapid double staining.
J. Roy. Micros. Soc. 1940 : **60** : No. 1–2 : 1–7.
An improved and simplified method of applying the Feulgen-Light Green method, suitable for use with root tip or pollen grain smears after pre-treatment with colchicine or chloral hydrate, is described.

BOTANY 58

12. RAMANUJAM, S. 581.162.5:633.853.49
Self-sterility and plant breeding.
Indian Fmg 1942 : **3** : 193–96.
The hereditary character and practical implications of self-sterility are discussed with special reference to work on *Brassica* sp. carried out at the Imperial Agricultural Research Institute.

13. LEWIS, D. 581.162.5.036:633
The physiology of incompatibility in plants I. The effect of temperature.
Proc. Roy. Soc. 1942 : **131** : Ser. B : No. 862 : 13–26.
Incompatibility between pollen and style may be of two types: (1) heterogamety, depending on the genotype of the individual pollen grain and (2) heterostyly, depending on the genotype of its parent. To discover whether these two types are physiologically related, the effect of temperature on pollen tube growth in these two genetic systems of incompatibility was studied in *Oenothera* spp., *Prunus avium*, *Primula* spp. and *Linum grandiflorum*.
The results adduced further evidence supporting the view that pollen tube inhibition through incompatibility is due to a reaction of the immunity type. High temperatures slow down the rate of incompatible-tube growth, a phenomenon which can be interpreted as evidence for increased precipitation of the specific proteins at higher temperatures. Also, no particular zone appears to exist in the style for this reaction which takes place between the tube and all the stylar tissue.
In considering the view that all self-incompatible species with the S system of incompatibility should be likely to have an immunity reaction, while distylic plants should have other mechanisms as well, the author points out that in *Primula obconica* and *P. sinensis* the mechanism is very probably of the immunity type since the temperature effect is the same as in *Oenothera* and *Prunus*. In *L. grandiflorum* (also distylic), on the other hand, no temperature effect on the rate of incompatible pollen tube growth could be detected and the mechanism is probably one of osmotic pressure differences. Lack of response to temperature is not however an infallible criterion for the type of reaction.

14. 582:578.08
Differences in the systematics of plants and animals and their dependence on differences in structure, function and behaviour in the two groups.
Proc. Linn. Soc. Lond. 1942 : **153** : 272–87.
The main object of this discussion (arranged at the request of the Association for the study of Systematics in relation to General Biology) was to discover by a comparative synthesis of generally established biological facts the essential differences between plants and animals and hence to deduce some of the reasons for the different systematic treatment of plants and animals.
Introducing the discussion W. B. Turrill emphasized the necessity (in the limited time available) for concentrating on the more highly developed groups and in many cases making the final

comparison between the Spermatophyta and the Vertebrata. The differences between animals and plants were then considered by him under the following main heads: Habit and structure; Growth and development; Physiology and biochemistry; Behaviour, including reproduction. Examining the differences in the systematic treatment of higher plants and of animals, the speaker found that they are far outweighed by the resemblances.
C. D. Darlington, J. S. Huxley, O. W. Richards, T. M. Harris and others contributed to the ensuing discussion. In view of the difficulties of reconciling such a wide subject with the limitations imposed by a single session, the only conclusion that could be reached was that all systematists had the same ends, but their method of approach varied.

INTRODUCTION OF NEW SPECIES 631.524

15. 631.524(54)

New economic crops.

Indian Fmg 1942 : **3** : 277–80.

Information is supplied on varieties of *Carica Papaya, Olea europea,* and on the need for study of *Aleurites Fordii, Agave* spp., *Boehmeria nivea, Manihot utilissima, Meteroxylon Sagus, Pistacia vera, Datura* spp., *Derris* spp.
At a meeting of the Crops and Soils Wing of the Board of Agriculture in India, the need for establishing a bureau similar to those existing in other countries for the introduction and testing of plant varieties was stressed.

PLANT DISEASES AND PESTS 632

16. Brooks, F. T. 632–1.521.6

Disease-resistant plants.

Endeavour, Lond. 1942 : **1** : 114–17.

A popular review of the problem and its history in various countries.

17. Larter, L. N. H. 632–1.521.6:575

Breeding plants resistant to disease.

J. Jamaica Agric. Soc. 1942 : **46** : 25–27.

Gives a general account of the methods followed by the plant breeder in evolving disease resistant varieties of the chief economic crops. E. K. J.

18. Cunningham, I. J. 632.421.9:575

The chemistry, pharmacology, and toxicology of ergot (*Claviceps purpurea*).

N.Z. J. Sci. Tech. 1941 : **23** : 138A–45A.

"The pharmacological and medicinal properties of ergot are due to the alkaloids which occur only in this fungus. Two of these alkaloids, ergotoxine and ergotamine, are known to possess, in addition, toxic properties which introduce an element of danger into their therapeutic use. Ergometrine, however, retains medicinal virtues while being practically devoid of toxic properties. It should therefore be the object to breed or select a race of *Claviceps purpurea* in which the proportion of ergometrine is greatly increased".

19. White, N. H. 632.421.9:575.114

The genetics of *Ophiobolus graminis* Sacc. 1. Heritable variations for culture colour and pathogenicity.

J. Counc. Sci. Industr. Res. Aust. 1942 : **15** : 118–24.

Segregation of two characters, pathogenicity on wheat and culture colour on potato dextrose agar is reported in single ascospore isolates from a single ascus of *Ophiobolus graminis.*
Four phenotypes (two spores of each) were found as a result of this segregation. Crossing-over is assumed. E. K. J.

20. Whitehouse, H. K. L. 632.421.9:575.116.4

Crossing-over in *Neurospora.*

New Phytol. 1942 : **41** : 23–62.

Analysis of asci of *N. sitophila* has confirmed that about 56% of asci show segregation for sex at the second division, compared with about 14% in *N. crassa.*
The gene for the mutant pink, obtained from the original stock, is located in the same arm

of the sex chromosome as the sex gene, and distal to it. The genes for the mutants brown and weak, probably X-ray induced, are proximal to the sex gene, and in the other arm of the sex chromosome respectively. A fourth mutant, orange, also probably X-ray induced, shows no linkage to sex.

21. 632.421.9:576.16:633.14
633.88:575(93.1)

NEILL, J. C.

Ergot.

N.Z. J. Sci. Tech. 1941 : **23** : 130A–37A.

An account of experiments made during 1940–41 on the production of commercial ergot by artificial inoculation of rye is presented. It has been shown that the strain of *Claviceps* sp. found on one species of grass or cereal may not attack other species. Preliminary work has therefore been directed to the determination of available strains which would give the maximum yield on rye. Results show that strains of ergot occurring on grasses in New Zealand are unable to infect rye. The strain from Hungarian ergot (presumably from rye) yielded heavy and uniform infection. However, following a field trial and on analysis of air-dried ergot, no alkaloid was found in the samples. This may be due to the strain of ergot fungus, the strain of rye, environment during growth, methods of harvesting and drying, or a combination of all these factors. Each requires further investigation.

22. STEPHEN, W. A. 632.422.3:576.16

Studies on the thermal resistance of honey yeasts.

Sci. Agric. 1942 : **22** : 705–20.

The time-temperature relationship to produce "commercial sterility" in Canadian honey was found to vary with the different species of yeast found in the honey. E. K. J.

23. BAGCHEE, K. 632.452:576.16:634.975

Contributions to our knowledge of the morphology, cytology and biology of Indian coniferous rusts. Part 1. *Cronartium himalayense* Bagchee and *Peridermium orientale* Cooke on *Pinus longifolia* Roxb.

Indian For. Rec. Bot. 1941 : **1** : 247–66.

A survey of Indian coniferous rusts with their probable alternate hosts is presented. These include three new species. The alternate stage of *Peridermium orientale*, the stem rust on *Pinus longifolia*, was found to be a physiological form of *Coleosporium campanulae* infecting *Campanula colorata*. The form on *Campanula canescens* had only a short telial stage and reproduced by over-wintering uredospores from year to year. E. K. J.

24. KUMAR, L. S. S. and
ABRAHAM, A. 632.5:576.312.35

Cytological studies in Indian parasitic plants. II. The cytology of *Loranthus*.

Proc. Indian Acad. Sci. 1942 : **15** : Sect. B : 253–55.

Following the first paper in this series (see "Plant Breeding Abstracts", Vol. XII, Abst. 654) the present account of the cytology of *L. longiflorus* records that there are 18 chromosomes in somatic cells and two of these are satellited. In discussion of the nucleolus, reference is made to the work on *Sesamum* (Cytologia, 1941, Vol. 12, No. 1).

ECONOMIC PLANTS 633

25. PAL, B. P. 633:575.7(54)

Degeneration of improved crops in India.

Indian Fmg 1942 : **3** : 261–64.

Causes of deterioration in the crops due to environmental conditions are considered, and include variation in disease resistance in its relation to physiological races of fungi, the mechanical admixture with poorer types of seed, and natural crossing. It is considered that degeneration of improved varieties is not inevitable if suitable precautions are taken.

26. 633–2.7–1.521.6
633.51–2.7–1.521.6(94)

Recent advances in economic entomology.
J. Aust. Inst. Agric. Sci. 1942 : **8** : 80–81.

In the course of an address by J. H. Smith to the Queensland branch of the Australian Institute of Agricultural Science the phenomena of morphological and physiological resistance of plants to insect attack were discussed, as well as the possibility of rendering the type of plant grown less attractive to pests through cultural practices without impairing the commercial merits of the crop. This possibility is actually being experimentally tested in a cotton growing project at Ayr, a region in which the spread of *Heliothis* is greatly favoured by climatic and other conditions.

The high degree of immunity of some varieties of cotton to jassid attack was mentioned as being apparently linked in some way with the hairiness of the plant.

WHEAT 633.11*

27. 633.11(42)
633.13(42)
633.16(42)

Varieties of cereals for autumn sowing.
Fmrs' Leafl. Nat. Inst. Agric. Bot. 1942 : No. 1 : Pp. 4.

Recommendations and short descriptions of the best varieties of wheat, oats, and barley for autumn sowing in counties as far north as Yorkshire are given. E. K. J.

28. KHAN, M. A. 633.11:575(54.5)

What's doing in All-India. The Punjab.
Indian Fmg 1942 : **3** : 152–55.

The merits of a new wheat, C 228, for late sowing under irrigated conditions in the Punjab are noted. In trials at departmental farms this variety has outyielded C. 591 in 93·7% of cases.

29. 633.11:575(93.1)

Wheat varieties in New Zealand.
Bull. Canterbury Agric. Coll. 1941 : No. 141 : Pp. 4.

A record of important changes which have altered the distribution of wheat varieties since the publication of a bulletin on this subject in January, 1939.

There is information on the use and merits of Cross 7, Solid Straw Tuscan, Dreadnought, Jumbuck, Velvet, Major, Solid Straw Velvet and Bencubbin. New wheats described are Tainui, Taiaroa, Fife-Tuscan and Holdfast.

30. THOMAS, I. and 633.11:575(94.1)
MILLINGTON, A. J. 633.13:575(94.1)

Wheat and oat variety trials—1941.
J. Dep. Agric. W. Aust. 1942 : **19** : 66–69.

The new wheat variety, Koorda, which is early maturing and strong strawed, has satisfactorily completed trials for yielding ability and disease resistance. It is anticipated that it will replace certain other varieties for late plantings on lighter soils. The variety W.4 promises to be useful for early midseason plantings.

In the oat trials it is reported that satisfactory yields have been obtained from the new varieties Dale and Ballidu. The former is a late midseason and the latter an early maturing variety, but both are derived from Mulga x Burt's Early, and are notable for their straw strength.

31. WATERHOUSE, W. L. and
WATSON, I. A. 633.11–2.452:576.16:631.521.6:575.11

Australian rust studies. VI. Comparative studies of biotypes of race 34 of *Puccinia graminis tritici*.
Proc. Linn. Soc. N.S.W. 1941 : **66** : 269–75.

Tests of fifty-five F_3 lines of the cross Dundee 985 x Kenya 745 and thirty of the cross Federation 107 x Kenya 745 showed the seedling resistance of the Kenya parent to race 34 to be due

* See also Abst. 5.

to the same gene in each cross. The parental reactions showed the American biotype of race 34 to be more virulent than the Australian form but the same gene governed resistance to both. Thirty-one lines of rye (varieties March and Petkus) were tested with race 34 of both the American and Australian biotypes and in this case different genes were sometimes found to govern resistance, since a race selected for resistance to the Australian biotype might be susceptible to the American.

The differences between the two biotypes were evident even at low temperatures; and differences were detected also in the colour of their uredosori. Some forms that gave identical reactions at 75° F showed clear differences in virulence when tested at 68° F and below. The present collection of 12 differential wheat varieties used for testing races of this pathogen is thus not sufficient to separate all biotypes.

32. PUTNAM, L. G. 633.11–2.7–1.521.6:581.44:575.127.2
A study of the inheritance of solid stems in some tetraploid wheats.
Sci. Agric. 1942 : **22** : 594–607.

The variety of *Triticum durum* known as Golden Ball has stems entirely filled with pith, in consequence of which it is resistant to the stem sawfly (*Cephus cinctus* Nort.). This variety was crossed with three hollow-stemmed varieties of *T. durum* and one of *T. turgidum*. The progenies were classified according to F_2 and F_3 data, which conformed to a monofactorial interpretation.

The solid character is partially dominant, and the distinction between solid and intermediate genotypes is not always possible, but the recessive hollow class is phenotypically readily distinguishable. There were indications however that some of the variation in the amount of pith present was also hereditary.

33. JACKSON, S. H. and WHITESIDE, A. G. O. 633.11:664.641.016
Investigations on the thiamin content of Canadian wheat and flour.
Sci. Agric. 1942 : **22** : 366–77.

"Of the varieties grown commercially in Canada, Regent and Renown wheat contained the greatest quantity of thiamin. Garnet contained the least, while Thatcher, Apex and Marquis were not as high as the first two mentioned varieties in comparisons made thus far.

The thiamin is concentrated in the wheat berry largely at the germ end of the kernel and in the germ proper. The germ itself, representing only a small percentage of the whole kernel, is not the main contributor to the thiamin content of the whole kernel. Those cells immediately surrounding the germ must also contribute substantially".

MAIZE 633.15

34. SHARMAN, B. C. 633.15:581.46
A six-stamened flower in *Zea mays* L.
New Phytol. 1942 : **41** : 130–33.

The organ described is regarded as a single flower probably developed from a single massive apex formed from two lateral buds originating close to each other. Morphologically it may be regarded as being composed of two florets "coalesced back to back".

35. SHARMAN, B. C. 633.15:581.481
A twin seedling in *Zea mays* L. Twinning in the Gramineae.
New Phytol. 1942 : **41** : 125–29.

Both embryos probably had the normal chromosome complement and appear to have arisen as the result of a constriction or partial longitudinal division of the early pro-embryo stage, giving two complete embryos attached to a single, partially divided scutellum and enclosed in a single caryopsis with a common mass of endosperm.

BARLEY 633.16

36. MEREDITH, W. O. S., ROWLAND, H. and SALLANS, H. R. 633.16:581.6(71)
Malting quality of Canadian barleys. III. Twenty-eight varieties, 1938, 1939 and 1940 trials.
Sci. Agric. 1942 : **22** : 584–93.

"A summary is presented of the comparisons, obtained from malting tests, of each of 27

barley varieties. These were represented by from 2 to 30 samples grown under different environmental conditions in 1938, 1939 and 1940 with comparable samples of O.A.C. 21, the standard malting variety. Reference is made to the limitations of the malting tests and varietal differences were demonstrated with respect to 8 important properties. These were: extract yield, diastatic activity and total wort nitrogen content of the malt; malting loss and sprouts; and total nitrogen content, 1,000-kernel weight of the barley and percentage heavy grade kernels".

MILLETS AND SORGHUM 633.17

37. KRISHNASWAMI, N. and
RANGASWAMI AYYANGAR, G. N. 633.171:575.243:537.531
Certain abnormalities in millets induced by X-rays.
Proc. Indian Acad. Sci. 1942 : **16** : Sect. B.: 1–9.

White banded leaves, foliation of the panicle and truncated panicles arose as recessive abnormalities induced by X-rays in *Eleusine coracana*. In *Pennisetum typhoides* X-ray treatment produced the following mutations, also recessive: gappiness, tip sterility, forking and goose-necking in panicle, male sterility and weak midribbed leaves. It was found that in both plants mutations were restricted to special plant characters. *P. typhoides* a diploid threw out more mutations than *E. coracana* a tetraploid. E. K. J.

38. KUMAR, L. S. S. 633.174:581.481
Non-heritable polyembryony in *Andropogon Sorghum*.
Curr. Sci. 1942 : **11** : p. 241.

Reports the occasional formation in Sorghum of "presumably diploid" twin seedlings with unequal vigour. E. K. J.

39. DOUGHTY, L. R. 633.174–2.5–1.521.6(67.8)
A note on *Striga* investigations at Amani.
E. Afr. Agric. J. 1942 : **8** : 33–38.

The control of attack on *Sorghum* by *S. hermonthica* in the densely populated areas of Usukuma, south of Lake Victoria, is an urgent necessity. Varieties of *Sorghum* resistant to *S. hermonthica* would be invaluable. Trials with varieties resistant to *S. asiatica* have shown that these are not also resistant to *S. hermonthica*. Experiments made for the study of resistance are recorded, but further work is necessary before recommendations can be made.

LEGUMINOUS FORAGE PLANTS 633.3

40. 633.367:581.6(93.1)
Lamb fattening : trials with sweet blue lupins.
Bull. Canterbury Agric. Coll. 1942: No. 154 : Pp. 4.

BLACK, M. A. and
CLARIDGE, J. H.
Sweet blue lupins.
N.Z. J. Agric. 1942 : **65** : 69-70.

Blue sweet lupins have been found superior to rape as a feed for young lambs. The lupins gave a greater average increase in weight per head, were less subject to pests and diseases and have a more beneficial effect on the soil. Certified seed is now available.

ROOTS AND TUBERS 633.4*

41. CARSON, G. P. and
HOWARD, H. W. 633.491:581.162.52
Self-incompatibility in certain diploid potato species.
Nature, Lond. 1942 : **150** : p. 290.

S. Rybinii and the closely related species, *S. boyacense* (clone E.P.C. 546), both set no berries on selfing. Berries with numerous seeds are obtained on crossing the two species in either direction and both species are cross-compatible with their F_1 hybrids. The hybrids produce no berries on selfing. It is also suggested that two other diploid ($2n = 24$) species, *S. phureja* and *S. lanciforme*, are self-incompatible. H. W. H.

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* See also Abst. 5.

42. DRIVER, C. M. 633.491–1.524
Recent advances in potato breeding.
N.Z. J. Sci. Tech. 1941 : **23** : 180A–84A.
There is a list of South and Central American species of *Solanum*, wild or partly cultivated, classified according to characters most valuable for breeding purposes. The list includes species with forms showing resistance to frost, or drought, to attack by Late Blight (*Phytophthora infestans*) or by Colorado beetle, with resistance to virus diseases, and species with a short dormancy period and those with a different composition from normal.

43. BAWDEN, F. C. 633.491–2.8–1.521.6
Potato virus diseases.
Nature, Lond. 1942 : **150** : 476–77.
A report of a joint meeting arranged by the Association of Applied Biologists and the British Mycological Society. The last paper was by Dr. G. Cockerham of the Scottish Society for Research in Plant Breeding. He stated that, in addition to varieties hypersensitive to viruses A, B, C and X (see "Plant Breeding Abstracts", Vol. X, Abst. 947), he has also found true resistance to the leaf roll and Y viruses in other varieties. H. W. H.

FIBRES 633.5*

44. ROBERTS, W. 633.51:575(54)
Estate farming in India. III. B.C.G.A. Farm, Khanewal.
Indian Fmg 1942 : **3** : 174–75.
The origin of NT cotton is noted. The above farm has had a major share in introducing 289F cotton of which a few ounces were brought from selections at Lyallpur in 1921. All subsequent long-staple types in the Punjab and Sind of the NT class are derived from this original seed. The most successful of all is a type selected at Khanewal Farm eight years ago and now grown over 2 lakhs of acres in the Punjab and a lakh of acres in Bahawalpur and Sind. The total area under 289F types is probably 1,000,000 acres in the Punjab, Bahawalpur and Sind.

45. 633.51:575(54.5)
KHAN, M. A. 634.58:575(54.5)
What's doing in All-India. The Punjab.
Indian Fmg 1942 : **3** : 286–88.
The merits of a new variety of *Gossypium* (124F) which has recently been bred at the Cotton Sub-Station, Multan, and is likely to become the commercial cotton of the Punjab, are described. There is also information on a new selection of *Arachis* (D-3), which has given good results in extensive tests carried out under varying conditions of soil, climate and moisture.

46. AHMAD, N. 633.51:581.6:575(54)
Technological research on cotton in India being an account of the work done at the Indian Central Cotton Committee Technological Laboratory, 1924–1941.
Indian Centr. Cott. Comm. Technol. Lab., Bombay 1942 : Pp. 182.
"In evolving new strains by hybridization it is necessary that the breeder has full knowledge of the fibre properties of the parent strains he wishes to cross". Information relating to this and many data from the study of the relationships between fibre properties and spinning quality of cotton are found in this useful report. The antiquity of cotton cultivation in India is shown by analysis of cotton fabrics from excavations at Mahenjo-Daro. E. K. J.

47. GADDUM, E. W. 633.51–2.7–1.521.6
Some observations on jassid at the Kenya coast.
Emp. J. Exp. Agric. 1942 : **10** : 133–45.
Significant differences have been found in *Gossypium* varieties in their attractiveness to jassid (*Empoasca facialis*) in different seasons. A graph is presented showing the difference in jassid population between the most attractive and the least attractive variety in the 1940 counts. This illustrates the range of variation between the varieties, and shows that the differences are well marked throughout the period of infestation.

* See also Abst. 5.

48. 633.52:581.6

Flax variety trials on Dominion experimental farms and stations 1941.

Mimeogr. Rep. Cereal Div. Centr. Exp. Farm, Ontario 1941 : No. 53 : Pp. 11.

Gives the yield per acre, days to maturity, length and strength of straw, oil content and iodine number of 23 varieties of flax. E. K. J.

49. WATERHOUSE, W. L. and WATSON, I. A. 633.52–2.452:576.16(94)

A note on determinations of physiological specialization in flax rust.

J. Roy. Soc. N.S.W. 1942 : **75** : 115–17.

Numerous reports of rust damage indicate that breeding for resistance will have to be carried out. All collections of the parasites so far made are regarded as falling within one physiological race, which however is different from the race reported by Flor (cf. "Plant Breeding Abstracts", Vol. VI, Abst. 805). The varieties Bison C.I. No. 389 and Argentine C.I. No. 705–1 are immune to the Australian race.

SUGAR PLANTS 633.6*

50. BRANDES, E. W. and COONS, G. H. 633.61:551.56:575 633.61:576.16

Climatic relations of sugar cane.

Aust. Sug. J. 1942 : **34** : 89–95.

The world distribution of sugar cane is reviewed and the origin and spread of canes from the two centres of origin, India and Melanesia discussed. The prehistoric and recent adjustments of the sugar cane to different climates is explained in terms of selecting and hybridization with wild forms of *Saccharum*. The determination of climatic requirements by test of basic types is expected to contribute to a precise evaluation of the world resources of sugar cane types. E. K. J.

51. 633.61:575(54.3) 633.61.0014(54.3)

DAS, C. M.

What's doing in All-India. United Provinces.

Indian Fmg 1942 : **3** : 342–44.

The notes include a record of promising early canes. These are Cos 109, Cos 146 and Co. 527. Also at the Muztaffarnagar farm and elsewhere, Co. 453 and Co. 545 have given satisfactory performance among the standard trial varieties. Another mid-season variety, Cos 196 promises to be superior to Co. 312, the standard cane of the western tracts, both in yield and sucrose content.

52. VASUDEVAMURTHY, M. 633.61:575(54.8)

What's doing in All-India. Mysore.

Indian Fmg 1942 : **3** : 219–21.

At the 22nd annual general meeting of the Mysore Agricultural and Experimental Union improvement in rice and cotton and sugar-cane breeding were subjects discussed. Recent sugar-cane breeding has evolved the promising strains HM 661, HM 647 and HM 645. The merits of each are noted.

Two cotton strains evolved in the Botanical Section of the Department of Agriculture and now grown on a large scale are MA 11 and Co 4.

53. 633.61:575(72.9) 633.61:575.127.2

Seventh Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados for the year ending September 30, 1940 : Pp. 30.

The breeding, seedling selection and trials done at the station were reported; 95% of the seedlings planted were "nobilizations" –crossses between sugar cane and *Saccharum spontaneum*, and *S. Barberi* and *S. sinense*. E. K. J.

* See also Abst. 5.

54. Venkatraman, T. S. and
Parthasarathy, N. 633.61:576.312.35:575.12
Chromosome counts in the sugarcane and its hybrids.
Curr. Sci. 1942 : **11** : 194–95.

"It would appear that in the case of sugarcane hybrids numbers alone may not be conclusive with regard to their parentages. Independent breeding tests to determine parental contributions, particularly on the mother side, are needed for indicating parentages with certainty. It is now well known that the number of chromosomes in sugarcane hybrids might either be the sum of the gametic numbers of the parents or the sum of the number in the male gamete plus twice the gametic number of the female parent. Recently, there is evidence to indicate that in certain male sterile sugarcanes, like P.O.J. 2725, seedlings may also arise through parthenogenesis, all of which shows that mere numbers alone are not sufficient to indicate parentage with certainty".

55. Kerr, H. W. 633.61–2.411.4–1.521.6:575(94)
Bureau of Sugar Experiment Stations. New variety trials and distribution.
Aust. Sug. J. 1942 : **34** : 153–55.

Q.28, a cross between the sugar cane variety Co.290 and Q.1098 was found to be resistant to downy mildew and is considered a replacement variety for Co.290 in medium and poor soils.
E. K. J.

56. Pickles, A. 633.61–2.7–1.521.6:575
A discussion of researches on the sugar-cane froghopper (Homop., Cercopidae).
Trop. Agriculture Trin. 1942 : **19** : 116–23.

Various cane-breeding organizations will probably produce new varieties with resistance to *Tomaspis saccharina*. It is necessary, however, that the characters producing resistance should be elucidated in detail for the guidance of cane geneticists, a task which so far has barely been attempted. Lines of work required are noted.

57. Williams, C. H. B. and 633.61.00.14(88)
Cameron, C. 633.61–1.421
Field experiments with sugar cane, X.
Sug. Bull. Dep. Agric. Brit. Guiana 1941 : No. 10 : 1–22.

"This Bulletin records the results of 40 variety and 21 manurial trials reaped during the year ended June 30, 1941. The method of conducting the trials has been described in previous bulletins of the series and it suffices to say that the layouts (randomized blocks, latin squares, $3 \times 3 \times 3$ complex) permit of the analysis of variance along the lines developed by Fisher and his school. The variety trials are interpreted mainly on yields of sucrose in cane per acre, the manurial trials on yields of cane per acre. For a discussion of the effects of fertilizers on cane quality, readers are referred to Sugar Bulletin No. 9, pp. 49–51" (see "Plant Breeding Abstracts", Vol. XI, Abst. 43).

58. Bell, G. D. H. and
Bauer, A. B. 633.63:581.143.26:581.035
Experiments on growing sugar beet under continuous illumination.
J. Agri. Sci. 1942 : **32** : 112–41.

Part I deals with developmental studies of beet under the influence primarily of artificial illumination and with special reference (1) to the effect of environment upon bolting, (2) to the possibility of using induced bolting under suitable conditions of light and temperature in selecting resistant forms, (3) to explore the possibility of raising seed from seed in one year. The variety used was Dobrovice.

The findings are fully discussed, stem elongation, flower production, anthesis and seed setting being separately considered in Part I, while glomerule yields, weight characteristics and germination are dealt with in Part II.

In addition to the acceleration of seed production observed, the following points are of interest to breeders and seed growers :—

The methods described should render it possible not only to multiply small seed stocks but also to isolate different genotypes for the bolting tendency.

The glomerule population characteristics exhibited by single plants varied considerably and, as a reflection of the seeding habit of the parent, are associated with important agronomic and economic characters and are therefore of the greatest significance in beet breeding.

PIGMENT PLANTS 633.86

59. Rao, L. N. 633.863.7:581.162
Studies in Santalaceae.
Ann. Bot., Lond. 1942 : **6** : 151–75.

Work on this family has been chiefly confined to study of the development of the embryo sac, notably in *Thesium*, while the economically important members have been largely ignored. The object of this work is to fill in this gap and to study some Indian representatives of the Santalaceae, namely, *Santalum album*, *Thesium Wightianum*, *Osyris arborea* and *Scleropyrum Wallichianum*. Details of the development of floral parts, of the embryo-sac, endosperm and embryo are recorded, and include information on mitosis, meiosis, and the processes of pollination and fertilization.

MEDICINAL PLANTS 633.88

60. Melville, R. 633.88:582
The botanical source of Indian Belladonna.
J. Bot., Lond. 1942 : **80** : 54–55.

Appreciable amounts of Indian Belladonna have recently been imported into Great Britain and the question of the correct name for the plant from which it is obtained has arisen. It was uncertain whether the Indian plant, to which two names have been applied, *Atropa acuminata* Royle and *A. Lutescens* Jacquemont (both however equated to *A. Belladonna* in the Index Kewensis), could be regarded as sufficiently distinct from the European *A. Belladonna* L. to constitute a separate species.

The synonymy and relevant literature are specified and some observations from a comparison of Kew herbarium material of *A. acuminata* and *A. lutescens* with *A. Belladonna* are given.

RUBBER PLANTS 633.91

61. O'Brien, T. E. H. 633.912:575(54.8)
Rubber investigations in Ceylon.
Emp. J. Exp. Agric. 1942 : **10** : 61–76.

The work carried out in the Botany and Mycology Department is reviewed. A collection of potentially high-yielding material at the Nivitigalakele Experiment Station is being used as a basis for breeding trials with *Hevea brasiliensis*. Crosses are being made by artificial pollination between trees of the best local clones, and between those clones and the best imported clones available. The technique employed is outlined.

62. Haines, W. B. 633.912:581.45
A method for foliage comparisons in field experiments with *Hevea*.
Emp. J. Exp. Agric. 1942 : **10** : 117–24.

Visual inspection of the amount of foliage or shade is regarded as the easiest criterion for judgment. The method described involves marking by purely subjective judgment and can be recommended where other factors such as leaf colour seem important enough to be brought into consideration. It is claimed that the method gives more speedy determination of tree reactions than any procedure hitherto generally used.

FRUITS 634

63. Welsh, M. F. 634.11–2.411.4–1.521.6
Studies of crown rot of apple trees.
Canad. J. Res. 1942 : **20** : Sect. C : 457–90.

Varieties of apples vary in their resistance to crown rot caused by *Phytophthora cactorum*. McIntosh was found most resistant and Canada Baldwin most susceptible. E. K. J.

64. Lewis, D. 634.13:581.163
Parthenocarpy induced by frost in pears.
J. Pomol. Hort. Sci. 1942 : **20** : 40–41.

Parthenocarpic fruits were produced without pollination in Conference and Fertility pears after submitting flowering branches of potted trees to — 5° C for 18 hours in a refrigerator. The high proportion of seedless fruits formed in certain years may thus be due to parthenocarpic stimulation by frost at the time of flowering. E. K. J.

65. Srikantia, C. and 634.441:581.192
Kantiengar, N. L. 634.441(54.8)
Analysis of Raspuri and Badami varieties of mango (*Mangifera indica*) grown in Mysore.
Proc. Indian Acad. Sci. 1942 : **15** : Sect. B : 280–84.

Determinations of changes, during development, of moisture content, ash, pH, titratable acidity, the reducing sugars and sucrose in the two varieties have shown that Badami contains a greater percentage of minerals and less of the sugars than Raspuri.

66. Wardlaw, C. W. 634.771:575(72.98)
Banana research at the Imperial College of Tropical Agriculture, Trinidad, B.W.I.
J. R. Soc. Arts 1942 : **90** : 644–55.

Describes the results of the research scheme financed by the Empire Marketing Board and carried out at the Imperial College of Tropical Agriculture, Trinidad, in collaboration with the Royal Botanic Gardens Kew for (1) the study and control of factors affecting the spread of Panama disease in the Gros Michel Banana, (2) hybridization experiments for the production of new commercial varieties immune to disease, (3) cold storage transport and ripening of hybrids and varieties that could be used as substitutes for Gros Michel. E. K. J.

FORESTRY 634.9

67. Dadswell, H. E. 634.973:582:578.08
The card sorting method applied to the identification of the commercial timbers of the genus *Eucalyptus*.
J. Coun. Sci. Industr. Res. Aust. 1941 : **14** : 266–80.

The advantages of this new method of timber identification are explained in detail with recommendations as to the best way of applying it, with special reference to the genus *Eucalyptus*. The method avoids the disadvantages of identification keys based on the dichotomous pattern, the three basic keys being simple to operate and elastic enough to allow of the inclusion of additional species without disrupting the main framework.
The system is being slowly extended to cover the commercial timbers of the world.

VEGETABLES 635*

68. Elden, H. van 635–1.531.12(68)
The production of vegetable seed.
Fmg S. Afr. 1942 : **17** : 425–30.

There is information on desirable characters for individual plant-selection, on mass selection, cross-pollination and the maintenance of varieties with uniform type and yields.

69. Thomas, P. T. and
Crane, M. B. 635.347:576.312.35
Genetic classification of *Brassica* crops.
Nature, Lond. 1942 : **150** : p. 430.

The chromosome numbers of 12 varieties of kales were determined. A chromosome number of $2n = 38$ was found for late rape, hungry gap and asparagus kales and of $2n = 18$ for dwarf Scotch, hearting, Russian, cottager's, thousand-headed, curly, perpetual, marrow-stemmed and ragged Jack kales. H. W. H.

70. 635.64–2.484–1.521.6:575.127.2
Bewley, W. F. 635.64–2.411.4–1.521.6:575.127.2
New tomato "Vetomold". Leaf mould immune.
Fruitgrower 1941 : **92** : p. 430.

A brief outline is given of the work of breeding tomatoes resistant to leaf mould (*Cladosporium fulvum*) at the Cheshunt Experimental and Research Station. Tests have been carried out with the resistant variety Vetomold developed by Dr. A. N. Langford at the University of Toronto, by crossing the Cheshunt variety Potentate with *Lycopersicon pimpinellifolium*. A description is given of Vetomold, which resembles Potentate in type but is more robust. Most English growers have been satisfied with the crop produced by the new variety, which has also shown signs of resistance to *Phytophthora infestans*.

* See also Abst. 5.

71. Hofmeyr, J. D. 635.64–2.484–1.521.6:575.127.2(68)
Good news for tomato growers. A new tomato resistant to fusarium wilt disease.
Fmg S. Afr. 1942 : **17** : p. 356.

The South American wild tomato, *Lycopersicon pimpinellifolium* (immune to *Fusarium* wilt) has been crossed at the Missouri Research Station, Columbia, Missouri, U.S.A. with ordinary tomatoes. The progeny inherited the resistance. Seed of the crosses, however, was not pure, as the plants showed variability in many respects, including variation in resistance. Seedlings from resistant specimens have been selected at the Sub-tropical Horticultural Research Station, Nelspruit, and crosses of these selections with good tomato varieties are being made.

72. Kumar, L. S. S. and
Abraham, A. 635.652:576.356.5:581.04
Induction of polyploidy in crop plants.
Curr. Sci. 1942 : **11** : 112–13.

Earlier works on the successful application of colchicine to Indian crop plants are noted (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 618; Vol. X, Abst. 626; Vol. XI, Abst. 579; Vol. XII, Absts. 706 and 728) and the technique of inducing polyploidy in *Phaseolus radiatus* is described. The method found most successful is the application of 0·4% colchicine in agar to the apical bud after the first pair of leaves had developed.

The value of artificially induced polyploidy is discussed in its relation to plant characters, chemical composition and food values.

Part II. Foreign.

STATISTICS 519

73. Davis, J. F.,
Cook, R. L. and
Baten, W. D. 519.24:631.421
A method of statistical analysis of a factorial experiment involving influence of fertilizer analysis and placement of fertilizer on stand and yield of cannery peas.
J. Amer. Soc. Agron. 1942 : **34** : 521–32.

The analysis of variance of an experiment involving the use of dummy plots is worked out in detail. The placement of fertilizers was found to be an important factor in the culture of cannery peas, yield responses being reduced when the fertilizers were placed in contact with the seed. O. K.

74. Goulden, C. H. 519.24:631.421
Fundamentals of experimentation.
Spragg Memor. Lectures Plant Breed., Mich. St. Coll. (1941) 1942 : 16–27.

The requirements of well balanced and efficient experimental designs are enumerated and discussed and the need for correct analysis and interpretation of the results emphasized. E. K. J.

75. Immer, F. R. 519.24:631.557
Distribution of yields of single plants of varieties and F_2 crosses of barley.
J. Amer. Soc. Agron. 1942 : **34** : 844–50.

An analysis of the type of distribution of single plant yields as measured by the k and g statistics is given. The variation in yield of single plants in spaced progeny was found to be determined by environmental factors only. E. K. J.

BREEDING 575

76. Riehm. 575:633(43)
Biologische Reichsanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. Wissenschaftlicher Jahresbericht 1938. (**State Institute for Agriculture and Forestry at Berlin-Dahlem. Scientific Report for 1938**).
Landw. Jb. 1940 : **90** : 201–344.

The report of the botanical section includes references to a number of new potato hybrids that are resistant to scab, and to a number of others resistant to wart; investigations to test the possible existence of biological races of the wart pathogen are in progress. The potato varieties Altgold, Jubel and Parnassia showed a high degree of resistance to the Y virus but were all susceptible to leaf-roll. An essential oil has been distilled from leaves of *Solanum demissum* and experiments are in progress to test whether this is in any way associated with the resistance to Colorado beetle found in that species. Material of three of the most promising W varieties (resistant to *Phytophthora infestans* biotype A) will be put on the market in 1943; crosses with *S. demissum* have shown that resistance to biotypes S and E is not genetically correlated with the defects of the wild species, except for a weak correlation with late maturity. Marked increases in starch content have been attained by crossing with *S. demissum*; an average of 19·5% starch has been recorded in the best families, while values of 24% and over are not rare. Studies of the cell behaviour of tubers infected with *Phytophthora* have shown that susceptible and resistant varieties react in the same way but the reaction of the cells is more rapid in the latter, with the consequence that the parasite is unable to form sporangia. Investigation of 9,089 potato hybrids for virus reaction has shown that no relation exists between resistance and tolerance. Several streak mosaic resistant hybrids and others tolerant to leaf-roll are being tested by growers.

Among a collection of Turkish wheats a form of *Triticum compactum* ($2n = 42$) was found which, when crossed with other hexaploids, gave dwarf progeny. No difference was observed between reciprocal crosses but the degree and frequency of dwarfing in the progenies differed

in crosses with different varieties, showing that the manifestation of the gene differed in different "genotypical environments".
Blue and yellow lupins have been found growing wild in great abundance in Spain, Portugal and north Africa; *Lupinus hispanicus* var. *bicolor* (Merino) was also collected wild and has been classed as a separate species *L. Rothmaleri* Klink.
Forms both susceptible and resistant to *Colletotrichum trifolii* have been found in a great number of leguminous genera.
Studies on varietal diagnosis have been made with potatoes, cereals, various root crops and legumes. Wheat varieties have been tested for reaction to smut and two classed as resistant. Resistant oat varieties have also been found and the more virulent smut races have been shown to occur less frequently than the less virulent. In tests of resistance to sprouting it has been found that the tendency to sprout in the ear, both in wheat and barley is reduced at low temperatures. Selection of non-bolting sugar and forage beets is carried out after treatment with cold and short day [sic]. Investigations have been made on resistance to *Fusarium* footrot in peas.
The resistant elm Christine Buisman has been artificially infected with *Graphium ulmi*.
From the Naumburg branch station two kinds of *Phylloxera* resistance in vines are reported, an active and a passive, both of which are hereditary. In crosses of *Vitis riparia* with European vines, F_2 segregation has been observed in respect of morphological features and type of response to infection; the root anatomy, the tannin distribution and the type of tubercle formed are inherited independently, and studies are being made to find out which combinations give the highest resistance and whether any correlation exists between the structure of root and shoot. The *Phylloxera* race with the short rostrum has shown a greater tendency to nymphosis than the race with the long rostrum, both on American and European vines; 9 biotypes are known up to the present. Segregation has been observed in the progenies of individual insects; thus the reaction of any vine is the result of the balance between the hereditary factors of both host and parasite. The parasite inherits certain "debility factors" which cause its doom when it meets a vine with certain particular "defence factors"; a parasite in which all debility factors are lacking would attack any vine, but so far none have been found in Europe that are completely lacking; all are for instance susceptible to the defence factors of the vine Cinerea Arnold. The results of large numbers of crosses of *V. riparia*, *V. rupestris*, *V. Berlandieri* and *V. cinerea* as regards reaction to 8 different biotypes are summarized. Monohybrid segregation occurred in many crosses both inter- and intraspecific, while other crosses showed more complicated ratios. A large number of hybrid seedlings of Cinerea Arnold with high quality vines have been under observation and a number of selections have been made. There is up to the present no indication of the existence of physiological specialization in *Plasmopara viticola*, but a number of different races have been found in *Pseudopeziza tracheiphila* H. Müll.
Investigations of large numbers of vine seedlings have been made with respect to susceptibility to melanism and frost. Early maturity of the wood was in some crosses dominant and in others intermediate, and was often multifactorial. The results of wilting tests did not conform with the field drought reaction of the varieties. The work on apple varieties resistant to woolly aphis has been continued. Large numbers of crosses of cultivated apples among themselves and with crabs have been made. F_1 hybrids between varieties with different osmotic pressure generally have the higher values.
The Aschersleben branch station reports successful selection experiments with *Phaseolus* varieties for resistance to *Phytomonas medicaginis* and with sugar beet for resistance to beet leaf bug (*Piesma quadratum*).
The Gliesmarode branch station has tested the bolting in different sugar beet varieties after cold treatment followed by supplementary illumination.
Studies have been made of the physiological races of *Puccinia glumarum*, *P. coronata*, *P. graminis avenae*, *P. triticina* and *Melampsora lini*. "Summer resistance" to *P. glumarum* has been found in barley but is less clearly defined than in wheat. The seedling resistance to yellow rust race No. 23 was studied in a number of barley crosses, some of which gave monohybrid segregation, others bifactorial; polymeric segregation with transgression towards susceptibility was observed in crosses between different resistant varieties; the same genes were responsible for resistance to race 46. Summer resistance in wheat has also been shown to be genetically conditioned.

77. ÅKERMAN, Å. 575:633(48.5)
Några synpunkter rörande filialernas betydelse i Utsädesföreningens verksamhet. (**Some aspects relating to the importance of the affiliated stations in the work of the Seed Association**).
Sverig. Utsädesfören. Tidskr. 1939 : **49** : 265–70.

The subject is discussed from the point of view of the differences in day length and temperature, etc., in relation to various latitudes covered by Sweden and the reactions of different crops and their varieties to particular environments. The need for testing in the area in which they are to be ultimately grown is stressed and possible variations in their disease resistance in different localities and soils are referred to.

The importance of the affiliated stations of the Swedish Seed Association in collaborating in research on plant breeding is emphasized by reference to their individual functions and contributions to the improvement of various crops.

78. LJ . . . . ., E. 575:633(48.5)
Sveriges Utsädesförenings årsmöte. (**Swedish Seed Associations annual meeting**).
Sverig. Utsädesfören. Tidskr. 1939 : **49** : 251–64.

The Association's work was described and also its contribution to the effort to render Sweden self-supporting (see Abst. 79).

79. *NILSSON-EHLE, H. 575:633(48.5)
Årsberättelse över Sveriges Utsädesförenings verksamhet under år 1938. (**Annual report on the work of the Swedish Seed Association during the year 1938**).
Sverig. Utsädesfören. Tidskr. 1939 : **49** : 183–240.

An extension of the work of the Association is recorded as a consequence of the inclusion of large scale investigations on the breeding of flax, soya bean and other crops.

Cytological research was done on wheat, rye, barley, timothy, cock's-foot, *Poa pratensis*, and potatoes. In addition to the constant forms of rye-wheat already available many new heterozygous rye-wheat types were produced partly by raising F_1, F_2 and F_3 generations from crosses between various constant Triticale varieties, partly by pollinating primary wheat x rye with rye-wheat pollen. Most of this heterozygous material consisted of F_2 and F_3 plants from Triticale Taylor x Triticale Rimpau. The F_3 plants were obtained by selection from about 70 plants chosen from an F_2 of 3,000 plants in which great variation in yield and quality was evident.

In conjunction with the field experiments cytological studies were made of the reduction division to elucidate the reduced fertility in Triticale forms. Some of these were multiplied up for a closer study of yield, quality, winter-hardiness, etc. Furthermore, some offspring from triple hybrids between rye and different wheat species, etc., were transferred to the wheat division for further investigation.

Tetraploid rye plants were also examined as to their external features, fertility, chromosome stability and their crossability with ordinary rye and wheat species. A new tetraploid plant was obtained by the heat shock method, which opens up possibilities for crossing Swedish and American tetraploid rye.

New barley types with double chromosome number were obtained by the same method.

Crosses between ordinary timothy and pasture type timothy underwent further cytological study as in previous years and work on cock's-foot and *Poa pratensis* was also continued.

In the chromosome division of the Association already several types of cereals, meadow plants and flax with increased chromosome number have been produced.

The colchicine technique was applied mainly to cereals and to some grasses. The results were mainly negative but some positive results obtained by the Genetics Institute (with other material) show that further experiments should be made.

The technique of vitamin C determination was also studied and also the ascorbic acid content

* An extended summary of this report is on file at the Bureau.

of numerous samples of potatoes. The following work on crop breeding was carried out at Svalöf and Ultuna:—

Wheat.
Breeding was concentrated for winter forms on quality improvement and the production of stiff straw. In addition, a new variety 01157 (from Standard x Trifolium) was obtained that combines better frost resistance than Trifolium 14 with a higher yield than Standard. Frost and *Leptosphaeria* resistance and baking quality were also important aims, while for the spring forms high yield and earliness were included in the breeding programme.

Oats.
A white oat, Solhavre No. 01422, for southern Sweden has been evolved from the cross Seger x Örn. Selection from three old land oats (northern white oats) from Småland, Bohuslän and Dalsland has resulted in a number of highly interesting lines several of which have been crossed with the best existing varieties.

Rye.
A winter rye line from the cross Malm x Finnish rye showed high yield combined with good grain quality and relatively high hectolitre weight.
Spring rye improvement was continued.

Barley.
Some new lines from crosses with Maja (made to improve its malting quality) gave high yields among the malting barleys and some new stiff varieties (from Seger x Opal) surpassed Kenia with both high and low nitrogen manuring.
Selection of fodder barley (two-rowed) was carried out on protein-rich land barleys to combine maximum yield with stiffness of straw and increased protein content.

Potatoes.
A primary aim is the production of wart immune varieties; numerous crosses were made and studies on the technique of selection are being carried out as well as the recording of land varieties.
Work on the South American material was continued and the morphological study of the material should soon be completed. Investigations on the ascorbic acid content of different potato varieties (specially those for northern Sweden) were begun.
Root crops are receiving attention, with special reference to bolting. Several turnip selections are recorded as resistant to *Plasmodiophora brassicae.*

Flax and Oil plants.
The initial material for flax breeding includes a large collection of foreign flax populations and pure varieties brought together by I. Granhall. The three main objects are: (1) a good quality flax for producing long fibre for manufacture and having at the same time a better yield of fibre than Blenda and Herkules: (2) a type for the production of coarse yarns and for cottonization—a combination type which, in addition to a high fibre yield, also sets abundant seed; (3) a linseed suited to Swedish conditions and with a high and reliable yield of seed.
Herkules and some Blenda lines, and among the foreign varieties the Lithuanian flax Ilgunéliai II and Irish Stormont Cirrus gave high yields of straw.
An anatomical study of the most interesting varieties has been started from the standpoint of fibre quality.
Varieties are also being selected for seed with some good results.
Hemp too has also been tried out and some varieties have given a good set of seed.

Legumes.
A new Concordia type pea Sv 36/37 gave a yield of 3,830 kg. per ha. and a new fodder pea Sv 36/42 from the cross Solo x Torsdags II gave 3,830 kg. per ha. Cooking quality and earliness are receiving attention.
Vetch selection and crossing is giving some very promising results.

Miscellaneous crops.
Work on sweet lupins, soya bean, maize and hops is being carried out.
There is also a full survey of the work at the various affiliated institutions and centres collaborating with the Association.

80. 575:633(49.4)
575:634(49.4)
MEIER, K. 575:635(49.4)
Bericht der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für die Jahre 1938/1939. **(Report of the Federal Experiment Station for Horticulture and Viticulture at Wädenswil for 1938/1939).**
Landw. Jb. Schweiz 1942 : **56** : 97–168.

Variety tests are in progress with apples and breeding work is being directed towards the production of good keepers and varieties resistant to scab. Pollination studies have been made with apples, pears, plums and sweet cherries.

An inheritance study on the vine crosses (Riesling x Sylvaner) x Räuschling and (Riesling x Sylvaner) x Gutedel has shown Gutedel to be a better parent than Räuschling as far as the yield of the progeny is concerned, but inferior as regards quality; 10 selections of wine grapes have been made from the Räuschling progenies and 5 from the Gutedel. An early ripening table grape has also been selected from the Gutedel cross. A cross of Blauer Burgunder x Schwarzer Veltliner has given inferior progeny; some white berried forms appeared, indicating that both parents are heterozygous.

Two new red and one white raspberry hybrids are being multiplied; also some new strawberry and red currant hybrids.

The Amager cabbage is not sufficiently early and selections from the so-called Bergkabis are being made to replace it. Selection work has been carried on with onions, lettuce and runner beans; a number of crosses between runner and bush beans have been made; the F_1 plants are of the runner type.

81. 575:633(72.94)
Haiti : Agricultural Research and development.
Chronica Botanica 1942 : **7** : 179–80.

The Experiment Station established at Damien, near Port au Prince, is notable primarily for the work in plant introduction and plant breeding. The Forbes-Barker strain of long-fibred cotton was developed at this station. The establishment and work of Shada (Societé Haitiano-Américaine Développement Agricole) is outlined. The Society during the first 6 months of operation has developed nurseries containing over 2,000,000 *Hevea*-seedlings.

82. SCHAUB, I. O.,
SALTER, R. M. and
BAVER, L. D. 575:633(75.6)
Agricultural research in North Carolina, 1939–1940.
Rep. N.C. Agric. Exp. Sta. 1940 : Pp. 74.

This bulletin contains, amongst other valuable information, an account of the plant breeding work carried out by the State College of Agriculture and Engineering:—

Wheat.

Carala, a selection from Alabama Blue Stem, has been the highest yielding variety at the Piedmont Branch Station, Statesville, where it has yielded 14·4% more than Nittany, the standard, and 7·2% more than any other variety in the tests. Though not resistant to leaf rust or smut it usually escapes on account of its earliness.

Oats.

Attempts are being made to combine the winter-hardiness of the variety Lee with the rust and smut resistance of Victoria; 11 selections from this cross or Hairy Culbertson x Victoria have given yields equal or superior to Lee; some approach Lee in hardiness.

Maize.

Yields have been raised by 30% by the use of hybrid corn. Hybrids made up of North Carolina breeding stock have consistently been superior to hybrids from other states, but multiple top crosses of imported single crosses with local varieties show considerable promise.

Barley.

The two bearded strains of barley, Davidson and Randolph, which were first released to farmers on a trial basis in 1938, have continued to give good yields and Davidson has outyielded the standard, Tennessee Winter, by 20·8%. A new hooded barley, Iredell, has also outyielded

the existing hooded form Tennessee No. 6 Hooded. Both Davidson and Iredell have proved resistant to *Ustilago nuda*, *U. nigra* and *U. hordei*.

Potatoes.
The new variety Sequoia, a selection from the cross Green Mountain and Katahdin, has outstripped Cobbler, Katahdin and Chippewa in yield. It is resistant to leaf hoppers and flea beetles and field resistant to late blight. It is late in maturity.

Cotton.
A new strain of Mexican cotton has been produced; it is earlier, more productive and makes a smaller growth than the parent variety and has a staple length of 1 in. or over. Certain hybrids and selections from other varieties are also promising. Clevewilt, Coken 4 in 1, Dixie Triumph and Wannamaker Early Wilt are good wilt-resistant varieties.

Groundnut.
On an average from 14 tests N.C. Selection 4 (Virginia Bunch type) ranked first in total yield, with a small runner type second; both of these two strains showed a rather wide range of adaptation. Hybrids between the principal peanut types, Virginia bunch, Jumbo runner, Valencia and Spanish, made in 1938, are now in the fourth generation. Only 120 out of 5,000 third-generation plants were selected to carry into the fourth generation. The results of back-crosses have seemed promising.

Blueberries.
Several wild blueberry plants with superior flavour, colour and size of fruit have been located and are being used for crossing, e.g. with the rabbit eye blueberry of Western Florida, which has the same chromosome number.

Strawberries.
The new Massey strawberry, produced by U.S.D.A. 634 x Blakemore, is a midseason variety, 10 days later than Blakemore, which it exceeds in fruit size though not in yield; its berries are of high dessert quality and keep better than most. The plants are exceptionally vigorous and generally free from leaf spot.

Lettuce.
Varieties with desirable market qualities combined with tip-burn resistance are under observation.

Soya bean.
The variety Wood's Yellow has produced exceptionally high yields largely owing to its complete freedom from shattering. Palmetto is also relatively free from shattering and an excellent form for both hay and seed.

83. 575:633(82)

Informe anual correspondiente al año agricola 1941–42. (**Annual report for the agricultural year 1941–42**).
Bol. Chacra Exp. "La Previsión" 1942 : **3** : 115–81.

Wheat.
Tests of *Tilletia* spores from different localities have indicated the probable existence of different races in different parts of Argentina. The wheat Oro [Gold] has proved very resistant and in the F_3 of crosses of Oro with a semi-susceptible variety Eureka, infections varying from 0 to 5% were obtained. In crosses of Oro with the susceptible variety La Previsión 25 the infection in F_3 varied from 0 to 100%.

Barley.
The local selection of malting barley La Previsión 19 has proved superior to all others. Some selections from the cross Selección II 13 x Forage are promising too. The forage barley R.M. 85 has proved highly resistant to *Ustilago hordei*.

Linseed.
The variety La Previsión 18 has given the highest yields and highest oil content, the next best being Malabrigo 43/35.

Sunflowers.
Certain local selections have proved superior in yield, though somewhat lower in oil content and 1,000 kernel weight.

84. Cross, W. E. 575:633(82)
Memoria anual del año 1941. (**Annual report for 1941**).
Rev. Industr. Agric. Tucumán 1942 : **32** : 5–114.

Cotton.
Variety tests have included a number of popular varieties and some new ones. A number of crosses have been made between local and imported varieties. Selections of Tucumán CI and of Lightning Express have proved promising. Studies of mutations, both natural and colchicine induced, are in progress.

Sugar cane.
Data are given on the behaviour of a number of imported cane varieties. Previous observations on the various mutant canes have been confirmed (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 379). Many of the more promising Tucumán seedlings (cf. "Plant Breeding Abstracts" Vol. XII, Abst. 830) have been distributed for planting.

85. 575:633(85)
Memoria anual de 1940 de la Estación Experimental Agrícola de la Molina. (**Annual report of the Estación Experimental Agrícola de la Molina for 1940**).
Lima, Peru 1940 : Pp. 30.

Wheat.
Selection for resistance to black stem rust is in progress.

Maize.
A collection of maize varieties is being established and 97 selfed lines are under observation.

Cotton.
In continuation of the results of previous years (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 73), further selections have been made in line LM No. 7–35 for height of insertion of 1st sympodium in relation to earliness; also with lines CÑ–LM (which has again proved the best in lint quality) and CB–LM and P–LM. The object is to produce a small plant with sympodial branching, with the minimum number of vegetative branches, with short internodes on the fruiting branches, early in maturity and adapted to dense sowings. The planters have expressed the opinion that the line L–M No. 7–35 supplied to them is much earlier than the original Tangüis, and is superior also in yield and excellent in fibre quality.
Resistance to *Verticillium* wilt has been observed in 16 of the 1937–38 selections and 10 of 1938 39. The 13 most promising lines have been selected. The reaction to wilt has been studied in the progenies of 378 resistant plants; from these, 61 progenies and 202 mother plants have been selected as phenotypically immune. Selections are made after the critical period in the development of the fungus, which is some 100 to 140 days after sowing. The selection of resistant lines has already led to a detectable reduction in the incidence of the disease. Lines W12–38 and W30–39 have maintained their resistance even when grown in artificially infected hot beds at 22° C.
Tangüis has been crossed with a number of Egyptian varieties with the object of obtaining a type with the growth habit of the Egyptian varieties and the fibre characters of Tangüis. The hybrid Tangüis x Sakel has been pronounced very promising by the trade.
Cytological studies have been made with *G. Raimondii* and its hybrids with other, both 13 and 26 chromosome, species. Colchicine treatment is being applied to the hybrids. Genetical studies have been made with the cleistogamous character and a "contorta" type which originated in Tangüis. A new wild cotton species has been found in the Zarumilla zone of Peru and is being investigated.

86. 575:633(92)
Mededeelingen van het Algemeen Proefstation der A.V.R.O.S. Algemeene serie No. 59. Verslag van den Directeur van het Algemeen Proefstation der A.V.R.O.S. over het tijdvak 1 Januari 1937–31 December 1939. (**Contributions from the General Experiment Station of A.V.R.O.S. General series No. 59. Report of the Director of the General Experiment Station of A.V.R.O.S. for the period 1 January 1937–31 December 1939**).
1939 : No. 59 : Pp. 76.
The following information about different crops appears in this report.

Derris.
In connexion with the chemical analysis of Derris samples an attempt was made in collaboration with Buitenzorg to arrive at a general standard method of determining rotenone content.

Tea.
Selection on various estates has been further promoted and a number of selected Java and Sumatra clones have been included in the experiments.

Rubber.
Tapping results from some thousands of buddings of AV clones from the numerous hybrid seedling families from Soengei Pantjoer, grown on the Dolok Merangir estate were published in 1939 (cf. "Plant Breeding Abstracts", Vol. X, Abst. 849); and already promising clones could be identified though the testing period had been somewhat shortened.

Oil palm.
About 6 hectares have been planted in the Polonia experimental plantation with various oil palm hybrids and about 7·6 hectares in the newly acquired Soengei Pantjoer and Aek Pantjoer plantations. Analyses have revealed pronounced differences in the oil content from various trees of the Deli type and this characteristic is to be included in the selection programme.
Types other than Deli are also undergoing selection and some trees with thin shelled fruits, which have given promising yield of oil, have been crossed *inter se* and with Deli palms.
A method was evolved for rapidly determining whether seeds of oil palm are viable or not. The structure of the seed was also studied, as well as the possible induction of more rapid germination.
The origin of crown disease in the oil palm is unknown, but the fact that the offspring from certain crosses are more susceptible than those from other crosses has been noted in breeding operations.
On one estate oil palm nuts from a particular cross germinated very badly and it was found that many lacked an embryo.
A programme of research for 1940 was formulated.

87. Almeida, J. M. de 575:633:575.3
Bases fisiológicas do melhoramento das plantas. (**Physiological basis of plant breeding**).
Rev. Agron. Lisboa 1941 : **29** : 433–49.
The importance of certain concepts in relation to practical breeding work is stressed; e.g. the law of homologous variation in finding desired forms such as the sweet lupins, etc.; the different genetic types of earliness; phasic development and vernalization; the carbon/nitrogen ratio, photoperiodism and phasic crossing. The conclusion is reached that genetics will continue to be the basis of plant breeding methods but the effects of environment upon the genotype and its expression will in future have to receive more attention.

88. Camara, A. and
Lorena, M. 575:633:581.02
A influência do meio no "ennobrecimento" das variedades culturais. (**Influences of environment on the "nobilization" of crop varieties**).
Rev. Agron., Lisboa 1941 : **29** : 251–58.
This is the full presentation of a paper already published in an abridged form (see "Plant Breeding Abstracts", Vol. XII, Abst. 968).

89. Camara, A. and
Azevedo, J. 575:633–1.531.12:575.3
Centros produtores de sementes. (**Seed production centres**).
Rev. Agron., Lisboa 1941 : **29** : 345–52.
The authors emphasize the fact that even after long periods of inbreeding all crop varieties are composed of large numbers of lines differing somewhat in small details, and especially in biological characters. This gives the variety a capacity for adaptation which a pure line in the strict sense would not possess, and leads to the necessity for carrying out seed production operations under the optimum cultural conditions, so as to select the strains best adapted to such conditions. In order to do this while at the same time conserving the varietal type it is

recommended that seed production centres should be established in the different zones of the country; such a system would avoid the loss of hardiness and other elements of varietal adaptation.

GENETICS 575.1

90. 575.1(73)

Report of the President of the Carnegie Institution of Washington for the year ending October 31, 1940.

Yearb. Carneg. Instn. 1939–1940 (1940) : No. 39 : Pp. 326.

Report of the President of the Carnegie Institution of Washington for the year ending October 31, 1941.

Yearb. Carneg. Instn. 1940–1941 (1941) : No. 40 : Pp. 346.

Among the many interesting points mentioned in the report of the Department of Genetics the following may be of interest to plant breeders: the autosomes have been shown to have no influence in sex expression in *Melandrium dioicum*. Studies of 68 periclinal chimaeras have definitely demonstrated the presence of three independent germ layers in the primordia of *Datura*. Polyploidy in cucurbits increases the size of the cells but reduces the number of cell divisions, the ultimate size of the organs being roughly the same in tetraploids and diploids. A pseudo-embryo has been formed in 4*n Datura* under the influence of naphthalene acetic acid; two substances are necessary for the production of parthenogenetic embryos, one an auxin and the other a so far unidentified substance probably of a proteinaceous nature. The gene for rough leaves produces normal leaves when transferred to another chromosome. Pollen abortion genes have been found in 8 out of the 12 *Datura* chromosomes and are proving most useful in the location of genes.

In the 40th Yearbook it is stated that pollen abortion genes have been found in 2 more chromosomes of *Datura*. One of the recessive gene types recently secured through X-ray treatment of seeds is of especial interest since it closely resembles in appearance the *quercina* virus disease, though it cannot be transmitted by grafting. By the use of coconut milk it has been possible to secure the growth in vitro of proembryos 0·15 mm. long which were taken out of the embryo sac only 10 days after pollination. A detailed study has been made of the sterility in crosses between 2*n* and 4*n Daturas*. In species crosses it has been found that relatively fewer tubes enter the ovary in a cross between 4*n* than between 2*n* races of a pair of species. Chromosome duplication had no effect on fertility in a number of self-sterile species tested. Extensive studies have been made of segmental interchanges occurring in *Datura* species in nature.

91. Magrzhikovskaya, K. V. and Sacharov, V. V. 575.12:576.16:575.24:576.12

Rôle of internal factors in the mutation process. Influence of hybridization on the rate of mutation.

C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 697–98.

Discussing the results obtained from intraspecific hybridization of two stocks of *Drosophila melanogaster* drawn from geographically remote localities, the authors claim (in contrast to previous investigators working with interspecific hybrids of animals or plants) to have provided for the first time evidence of increased mutation frequency in hybrids obtained from stocks belonging to the same species. This fact is held to be a new proof of the importance of the role of genetic factors in the mutation process, exemplified in this instance by the role of crosses occurring between separate wild populations, and to support Sturtevant's assumption that despite the general tendency of mutability to decrease in separate populations, it may be increased by intraspecific crossing.

Thus a new method for increasing spontaneous hereditary variation is obtained without resorting to external factors such as X-rays.

92. Hubricht, L. and Anderson, E. 575.12:581.162.32

Vicinism in Tradescantia.

Amer. J. Bot. 1941 : **28** : p. 957.

A study of cross-pollination relationships in two species of this genus indicates that cross-pollination occurs by natural agencies when the plants are growing near each other, in spite

of such barriers as differences in season of bloom. A lack of hybrids under natural conditions may be attributed to a lack of intermediate habitats in which the hybrids are able to develop to maturity.

93. JONES, D. F. 575.125:576.356.2
Chromosome degeneration in relation to growth and hybrid vigour.
Proc. Nat. Acad. Sci. Wash. 1942 : **28** : 38–44.
The question of heterosis is re-examined in the light of recent research. The depressive effect of inbreeding is thought to be due to chromosome deficiencies too small to have any other visible effect. The fact that almost all combinations of inbred parents give heterosis shows that the number of loci which may be deficient is exceedingly large.

94. TYSDAL, H. M. 575.125:633.3:576.356.5
Controlled heterosis as a method of forage crop improvement.
Spragg Memor. Lectures Plant Breed., Mich. St. Coll. (1942) 1942 : 28–38.
The importance of the knowledge of the degree of polyploidy and breeding behaviour of forage crops is discussed and the possibilities for the production of commercial F_1 hybrids in alfalfa examined. E. K. J.

95. SAX, K. 575.17:577.17
Diffusion of gene products.
Proc. Nat. Acad. Sci. Wash. 1942 : **28** : 303–06.
Several instances are cited in illustration of the fact that certain gene products essential for growth can diffuse between attached cells. Other products, such as those necessary for protein disintegration, are incapable of such diffusion.

96. STADLER, L. J. 575.24
Some observations on gene variability and spontaneous mutation.
Spragg Memor. Lectures Plant Breed., Mich. St. Coll. (1939) 1942 : 3–15.
"The experimental analysis of gene mutation is not necessarily a technical impossibility. The mutations which occur spontaneously produce alleles of definite and distinctive properties; their apparent rarity may be only a consequence of the crudeness of our methods of detecting variability. In the case of some genes it may be feasible to determine the frequency of mutation from and to various distinct levels and types of activity, and to compare in detail the physiological action of the parent and the mutant alleles. Intensive studies of these two kinds should yield results on the basis of which specific hypotheses of gene structure and gene action may be formulated and experimentally tested". E. K. J.

97. LANGHAM, D. G. 575.242.061.1:581.035
The effect of light on growth habit of plants.
Amer. J. Bot. 1941 : **28** : 951–56.
Negative phototropism to light of high intensity is probably the major cause of prostrate growth habit. There is some indication that the mutation from prostrate habit to erect habit, or *vice versa* probably occurs in many species. The frequency of this mutation might be increased by treatment of seed or pollen grains with X-rays or ultra-violet rays.

98. SAX, K. 575.243:537.531:576.356.2
The distribution of X-ray induced chromosomal aberrations.
Proc. Nat. Acad. Sci. Wash. 1942 : **28** : 229–33.
Multiple aberrations were much less frequent than was expected in X-rayed material, while ring chromosomes were more frequent than would be expected. The factors determining the frequency of effective breaks are thought to be (*a*) the spatial relations of the chromosome, (*b*) the stresses imposed by the centromere in maintaining polarity and (*c*) the stage of chromosome development in the nuclear cycle.

ORIGIN OF SPECIES 576.1

99. TURRILL, W. B. 576.1:582
Taxonomy and phylogeny.
Bot. Rev. 1942 : **8** : 247–70. [Parts 2 and 3 to appear later].
The principal advances in taxonomy are due, among other factors, to the inclusion of results from modern advances in the study of genetics and cytology.

100. Gates, R. R. 576.312.315
Nucleoli and related nuclear structures.
Bot. Rev. 1942 : **8** : 337–409.

The review includes reference to the following aspects: nucleolar size (special reference to wheat and rice varieties); nucleoli and satellites (tables of species in which apparent diploids with 4 nucleoli are recorded); and the phylogenetic significance of nucleoli. It is concluded that the number of nucleoli in the cells of a species is probably as important phylogenetically as the number of chromosomes. Future reports of chromosome numbers should include at least a determination of the number of SAT chromosomes, the number of secondary constrictions and the number and sizes of the nucleoli in somatic telophase.

101. Piza, S. de Toledo (jun.) 576.312.34:576.354.46
Dorso-ventralidade dos cromossômios. (**Dorsoventrality of chromosomes**).
Rev. Agric., S. Paulo 1942 : **17** : 154–68.

The author maintains that chromosome pairing is due not to attraction between the genes but to structural differences existing between the two ends. This furnishes an explanation of many position effects observed by geneticists.

102. Jeffrey, E. C. and 576.354.4
Haertl, E. J. 576.354.46
The present status of synapsis and chiasmatypy.
Amer. J. Bot. Suppl. 1941 : **28** : p. 4s.

The generally accepted view that the chromosomes pair side by side in meiosis is apparently without sound foundation, since the meiotic chromosomes have exactly the same organization as the reproductive chromosomes, the chromosomes of the gametophyte, the endosperm, and the sporophyte. It is obvious, accordingly, that in the meiotic divisions there is a splitting of chromosomes, not a fusion. Consequently it seems inaccurate to speak of parasynapsis (conjugation); since parasynapsis does not take place, the chiasmatypy hypothesis ceases to be valid.

103. Pirschle, K. 576.356.5:535.61–31
Weitere Beobachtungen über den Einfluss von langwelliger und mittelwelliger UV-Strahlung auf höhere Pflanzen, besonders polyploide und hochalpine Formen (*Stellaria, Epilobium, Arenaria, Silene*). [**Further observations on the influence of long and medium wave ultraviolet rays on higher plants, especially polyploid and high alpine forms (*Stellaria, Epilobium, Arenaria, Silene*)**].
Biol. Zbl. 1941 : **61** : 452–73.

Alpine types were more tolerant of medium ultra-violet rays than types from the plains. Little or no difference was observed between tetraploids and their corresponding diploids.

104. Goodspeed, T. H. and
Bradley, M. V. 576.356.5:575.129
Amphidiploidy.
Bot. Rev. 1942 : **8** : 271–316.

Aspects discussed include: the origin of amphidiploidy and its experimental induction; the origin and character of naturally occurring amphidiploids; their morphological and physiological characteristics; the cytogenetics of amphidiploids; fertility and "crossability"; and the evolutionary significance and distribution of amphidiploids.

105. 576.356.5:576.341
635.64:576.356.5
Györffy, B. 635.64–2.112–1.521.6
Untersuchungen über den osmotischen Wert polyploider Pflanzen. (**Investigations on the osmotic value of polyploid plants**).
Planta 1941/42 : **32** : 15–37.

Tetraploids of *Capsicum annuum* and certain other plants had lower osmotic values than the corresponding 2*n* plants. The differences were small but tended to increase with the age of

the plant. In certain other species, including *Lycopersicon esculentum*, the tetraploid values equalled or even exceeded the diploid in the older plants; younger plants always had the lower values in the diploids.
Experiments in "climate chambers" showed the tetraploids to be more drought resistant than the diploids, particularly in *Lycopersicon*, and under drought conditions the 4*n* plants had the higher osmotic values. Thus in the moist chamber the 4*n* was 1 atm. below the 2*n* and in the dry chamber as much as 2 atm. above. In the open too the tetraploids often had the higher values and seem in general to be more capable of modification than the diploids.

106. Bolle, L. and
Straub, J. 576.356.5:576.354.46
Die Paarungskräfte im Hetero- und Euchromatin von tetraploider *Impatiens balsamina*. (Vorläufige Mitteilung). [**The pairing capacity in hetero- and euchromatin in tetraploid *I. balsamina*. (Preliminary communication)**].
Planta 1941/42 : **32** : 489–92.
In tetraploid plants true pairing was observed between chromosome pairs in the heterochromatic sections, the pairing being less intense in the euchromatin.

107. Bauch, R. 576.356.5:577.17
Über Beziehungen zwischen polyploidisierenden, carcinogenen und phytohormonalen Substanzen. Auslösung von Gigas-Mutationen der Hefe durch pflanzliche Wuchsstoffe. (**Relations between polyploid producing, carcinogenic and growth promoting substances. Production of gigas mutations in yeast by plant hormones**).
Naturwissenschaften 1942 : **30** : 420–21.
The chemical relationships between the various substances that induce polyploidy are discussed, and their effects are shown to be in many ways analogous to those of plant hormones.

108. Levan, A. and
Levring, T. 576.356.5:581.04
Some experiments on *c*-mitotic reactions within Chlorophyceae and Phaeophyceae.
Hereditas, Lund 1942 : **28** : 400–08.
It has been shown that *Ulva* spp. react to acenaphthene in the same way as the higher plants react to colchicine; but to colchicine *Ulva* is almost or completely indifferent. The possible reasons for this behaviour, which is similar to that of *Colchicum* itself, are discussed.

109. Sancho Peñasco, F. 576.356.5:581.04
Las mutaciones provocadas. (**Induced mutations**).
Bol. Inst. Nac. Invest. Agron. Madr. 1941 : No. 5 : 153–70.
A review is given, for the benefit of Spanish readers, of the recent work on colchicine, most of which has already been referred to in "Plant Breeding Abstracts".

110. Sokolovskaya, A. P. and
Strelkova, O. S. 576.356.5:581.056:576.16:633
Polyploidy and karyological races under conditions in the Arctic.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 144–47.
The authors' karyological investigations of the flora of Kolguev Island in 1939 continued the research on the problem of the geographical distribution of polyploids.
The analysis here presented of their observations on various species (including *Salix*, *Rubus*, *Poa* and *Alopecurus* spp.) leads to the conclusion that a definite correlation exists between polyploidy and the extreme climate of the Arctic. Nevertheless, indiscriminate application of this idea of compliance with an underlying law is precluded by the presence in the Arctic flora of species of different origin. Each separate case must take into account numerous historical, taxonomic and genotypic features as well as the routes of migration of the species composing a particular flora.

111. Löve, Á. 576.356.5:581.6
Physiological differences within a natural polyploid series.
Hereditas, Lund 1942 : **28** : 504–06. (Abst.)
From observations on the natural polyploid series *Rumex* subg. *Acetosella* it is found that cell size, osmotic pressure, pigment content, and the pH of the sap increase proportionally to increase in chromosome number. The content of oxalic acid and ascorbic acid, however, decreases with increase in polyploidy. The diploid species may be a short-day plant, the polyploid species being long-day plants.

112. Pirschle, K. 576.356.5:581.6
Stickstoff- und Eiweissanalysen an autopolyploiden Pflanzen. (**Nitrogen and protein analysis in autopolyploid plants**).
Planta 1941/42 : **32** : 517–34.
In some species the tetraploid plants contained more N and protein than the corresponding diploids, but in the majority of species less, especially when reckoned on a fresh weight basis. An octoploid of *Torenia Fournieri* was higher than the diploid in protein content on a dry weight basis, although the tetraploid was lower; the octoploid was lower than either $4n$ or $2n$ however on a fresh weight basis.
The protein yield per plant was often higher in the polyploids, though this was by no means always the case.
Triploids of *Epilobium collinum* and *E. alpinum* were intermediate in value between the $2n$ and $4n$; hybrids of the two species, and the tetraploids from the hybrids were equal or inferior to the parental species.

113. Pirschle, K. 576.356.5:631.557
Quantitative Untersuchungen über Wachstum und "Ertrag" autopolyploider Pflanzen. (**Quantitative investigations on growth and yield of autopolyploid plants**).
Z. indukt. Abstamm.-u. VererbLehre 1942 : **80** : 126–56.
Detailed comparisons were made between diploid and artificially produced autotetraploid plants of *Epilobium collinum, Stellaria media, Antirrhinum majus, Tradescantia geniculata, Torenia Fournieri, Petunia nyctaginiflora, Brassica oleraceae* (kohl-rabi) and various races of *Impatiens balsamina*. In all species the $4n$ leaves were larger and thicker; as a rule the number and length of the side shoots was less and the leaves were broader; the $4n$ plants all flowered later and the number of flowers was less. The dry matter and chlorophyll content was less in the tetraploids and the water content higher. The size of the shoots and the plant-weight were in some species greater in the polyploids, in others greater in the diploids; different genotypes of *Impatiens* behaved differently in this respect. The effect of chromosome duplication thus depends entirely on the genotype of the initial material. The differences between diploid and polyploid were even manifested in different degrees at different ages and in different environmental conditions.

114. 576.356.5:633.42
Pirschle, K. 576.356.5:633.71
Weitere Untersuchungen über Wachstum und "Ertrag" von Autopolyploiden ($2n$, $3n$, $4n$) und ihren Bastarden. [**Further investigations on growth and "yield" of autopolyploids ($2n$, $3n$, $4n$) and their hybrids**].
Z. indukt. Abstamm.- u. VererbLehre 1942 : **80** : 247–70.
Comparisons were made of $2n$ and $4n$ Savoy cabbage (var. Saxa), $2n$ and $4n$ kohl-rabi and $2n$ and $4n$ Savoy x kohlrabi hybrids. No significant differences could be detected in leaf weight, the dry matter content was lower in the tetraploids. The "roots" were somewhat larger in the tetraploid kohl-rabi, though the differences were not statistically significant; the hybrids had smaller roots than the corresponding kohl-rabi parent, the difference being more marked in the tetraploids than the diploids. The dry matter content of the roots was not less in the tetraploids than the diploids. The hybrid roots were very woody and unsuitable for culinary purposes.
Similar observations were made on $2n$, $3n$ and $4n$ plants of *Nicotiana Tabacum* (var. Java), of *N. glutinosa* and of the *N. Tabacum* x *N. glutinosa* hybrid. The $4n$ plants of both species

had smaller, darker green leaves, flowered later, and had shorter shoots. The triploid hybrids however were more vigorous vegetatively than either $2n$ or $4n$ and were larger and heavier than either. All the tetraploids had a lower dry matter content than diploids and triploids. This was also true of tetraploids of Epilobium, where the tetraploids were larger and heavier than the triploids and diploids.
It is once more concluded that polyploidy does not in itself produce greater vigour but can do so when applied to individuals showing heterosis.

MICROSCOPIC TECHNIQUE 578.6

115. HANCOCK, B. L. 578.6
A schedule for chromosome counts in some plants with small chromosomes.
Stain Tech. 1942 : **17** : 79–83.
A schedule is given which produced excellent results for somatic chromosome counts of some British species of *Galium*. These species present great difficulties owing to the small size of the chromosomes (1·5μ long), the large somatic numbers (up to 96) and the slenderness of the root tips. It is suggested that the schedule will be valuable in chromosome counts of other plants where similar difficulties arise. H. W. H.

116. STOWEL, R. E. 578.6
The use of tertiary butyl alcohol in microtechnique.
Science 1942 : **96** : 165–66.
Tertiary butyl alcohol can be used partially to replace dehydrating agents such as ethyl alcohol and clearing agents such as xylol and benzol. Schedules for its use are given. H. W. H.

117. SVESHNIKOVA, I. N. 578.65:577.8:633.35
Analysis of nucleus development and of changes of thymonucleic acid in ontogenesis.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 216–18.
This paper deals largely with the biochemical basis of the staining reactions observed in the female germ cells in the pea, vetch, etc., and the problem of differential staining capacity in dioecious plants and sex differentiation in general.

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118. KHLEBNIKOVA, N. A. and MOSKOVETZ, K. G. 581.143.26.03:633.88:581.163
On the biology of *Chenopodium ambrosioides* L.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 161–62.
The All-Union Institute for Medicinal Plants is attempting to establish the cultivation of *C. ambrosioides* in Russia. The variety *anthelminticum* A. Gray (No. 545), which is of special interest owing to its productivity and high yield of ascaridole (72·2%), transferred from Samarkand to Moscow failed to form flowers or did so only on the 146th day. Variety No. 554 grown at Poznan and known to do well in Moscow was used as a control of experiments with No. 545 to test its requirements as regards conditions of vernalization and photoperiod in Moscow.
The results showed marked differences between the two varieties in the requisite conditions for successful growth.

119. KHLEBNIKOVA, N. A. 581.143.26.035.1:633.75:576.16
Growth and development of white poppy on varying daylength.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 503–04.
Tests of response to different lengths of day in conjunction with varying conditions of nutrition (including moisture) were made with two sub-species of *Papaver somniferum*, one from Tarbagatai and another from Tian-Shan. Nutrition appeared to have no effect on the photoperiodic reactions of the species.
Though *P. somniferum* is a long-day plant the Tian-Shan form tolerates a short photoperiod. The Tarbagatai form does not. Under the same length of day the latter proved less susceptible to the influence of external conditions.

120. WITTWER, S. H. and MURNEEK, A. E. 581.162.4:577.17
Relation of sexual reproduction to development of horticultural plants. II. Physiological influence of fertilization (gametic union).
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 205–08.
It is concluded that some catalyst or substance of hormone-like nature must be produced at the time when the male and female gametes unite, resulting in increased vegetative development. Triple union, or endosperm formation, may also be effective in the production of a stimulating substance. Investigations are under way to extract and isolate the substance or substances.

121. SKIRM, G. W. 581.481:575:633:578.08
Embryo culturing as an aid to plant breeding.
J. Hered. 1942 : **33** : 211–15.
"It appears that much of the sterility inherent to interspecific hybrids, as expressed by the abortion of the partially developed embryos, can be overcome by excising the young embryos under aseptic conditions and placing them on suitable nutrient media. Four hundred and fourteen embryos from 116 different interspecific *Prunus* crosses have been successfully germinated, and approximately 300 embryos from 29 different *Lilium* crosses have been successfully germinated by using the embryo culturing technic. Work along these lines in other genera undoubtedly will enable the plant breeder to obtain many forms which were genetically possible but that previously have been unobtainable".—Author's summary.

INTRODUCTION OF NEW SPECIES 631.524

122. REGEL, C. 631.524(4)
Beiträge zur Kenntnis von mitteleuropäischen Nutzpflanzen, III. (**Contributions to the study of Central European plants of economic value, III**).
Angew. Bot. 1942 : **24** : 278–302.
Descriptions are given of the characters and virtues of various edible *Diospyros* species, of *Physalis peruviana*, *Dipsacus sativus*, and of a number of new fodder plants and essential oil bearing plants.

123. CAMARA, A. and CASTRO, R. 631.524:576.12
Protecção das zonas de interêsse genético. (**Protection of regions of genetic interest**).
Rev. Agron., Lisboa 1941 : **29** : 524–29.
A full version of the paper reviewed in "Plant Breeding Abstracts", Vol. XII, Abst. 1002.

PLANT DISEASES AND PESTS 632*

124. STUDHALTER, R. A. and GLOCK, W. S. 632.111–1.521.6:578.08:634
Apparatus for the production of artificial frost injury in the branches of living trees.
Science 1942 : **96** : p. 165.
It is claimed that the apparatus described has the following advantages over previous ones—ease of application to branches, the production of a wide range of low temperatures and of conditions similar to those in nature. Solid carbon dioxide is used as the cooling agent.
H. W. H.

125. HANSEN, H. N. 632.4:575.24:576.312
Heterocaryosis and variability.
Phytopathology 1942 : **32** : 639–40.
Heterocaryosis describes the condition of a cell containing two or more genetically different nuclei. It is initiated by mutation within a plurinucleate entity or by fusion or anastomoses between cells having genetically unlike nuclei.

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* See also Abst. 86.

Heterocaryosis may appear to be the cause of variability, but the basic cause of variability and the primary cause of heterocaryosis is mutation.

126. SPRAGUE, R. 632.4:633.1
A revised check list of the parasitic fungi on cereals and other grasses in Oregon.
Plant Dis. Reporter Suppl. 1942 : No. 134 : Pp. 36. (Mimeographed)
The list includes 677 citations of fungi on separate hosts. In classifying the grasses and cereals the work of Hitchcock (cf. "Plant Breeding Abstracts", Vol. V, p. 375) has been followed, but varieties, except in rare instances, have not been segregated.

127. STEINBERG, R. A. and THOM, C. 632.421.2:575.243:581.04
Reversions in morphology of nitrite-induced "mutants" of Aspergilli grown on amino acids.
J. Agric. Res. 1942 : **64** : 645–52.
Reversions to the morphology of the original strain took place with a nitrite-induced mutant of *A. niger* when grown on certain amino-acids listed.
Comparison of capacities for amino-acid utilization between the standard strain and each of two variant strains of *A. niger* disclosed alterations proportional to the extent of morphological change. These changed assimilation capacities in the variants did not destroy the general nature of the responses characteristic of the original strain, though individual amino-acids were affected. The variant having greater alterations in morphology showed much less capacity for assimilation of the fully plastic acids (aspartic acid, glutamic acid, and proline) and increased capacity for utilization of the aplastic acids (cystine, histidine, lysine, norleucine, and tyrosine). Utilization of hydroxyproline had become particularly poor in the almost sterile or more atypical variant. Enzyme suppression with nitrite disturbed cell maturation as in abnormal cells produced in animals by carcinogenic compounds.

128. DODGE, B. O. 632.421.9:575.125
Heterocaryotic vigor in Neurospora.
Bull. Torrey Bot. Cl. 1942 : **69** : 75–91.
A new yellow non-conidial dwarf race, Dwarf 16, which grows only about 2 cm. per week, reacts as a unisexual race, sex *a*, when grown with the tester races C_4 and C_8 of *N. tetrasperma*. When this dwarf is grown with race C_4, of the opposite sex, sex A, nuclear migrations occur so that nuclei of both races come together in a common heterocaryotic mycelium which shows great increase in vigour of growth and conidia production. The new mycelium grows two or three times as fast as does that of race C_4. This increased vigour is referred to as heterocaryotic vigour, and is distinguished from individual haploid segregant vigour and from true hybrid vigour expressed in connexion with diploid organisms. It is suggested that perhaps the hypothesis offered by Robbins (see "Plant Breeding Abstracts", Vol. XI, Abst. 831) may be applied here.
Preliminary work in crossing Dwarf 16 with race C_4 shows that this factor complex is heritable. Some of the haploid segregants carry in turn very similar factors for heterocaryotic vigour.

129. TATUM, E. L. and BEADLE, G. W. 632.421.9:575.243:577.16
Genetic control of biochemical reactions in *Neurospora* : an "amino-benzoicless" mutant.
Proc. Nat. Acad. Sci. Wash. 1942 : **28** : 234–43.
An X-ray mutant of *N. crassa* was incapable of synthesizing para-aminobenzoic acid, recently recognized as a factor required for growth of a number of micro-organisms and as a member of the vitamin B group. The mutant differed from the normal in a single gene and in crosses with a normal strain, 72 of the spore cultures resulting were capable and 70 were incapable of synthesizing the product. The character was inherited independently of sex; a tendency to segregate in the 2nd division shows it to be located at some distance from the centromere.
A second occurrence of the mutant is reported and comparisons of the behaviour of the two strains showed them to be apparently identical. Growth of both normal and mutant strains

was inhibited by sulphanilamide and in both cases the inhibition is overcome by *p*-amino-benzoic acid.

130. Bever, W. M. 632.451.2:575.11:633.16
A nonpathogenic buff-colored barley smut.
Phytopathology 1942 : **32** : 637–39.
A study of the genetics and hybridization between a physiological race of *Ustilago hordei* and two races of *U. nigra* Tapke has been made. There is indication that the factors governing sex and pathogenicity are distinct.

131. Kernkamp, M. F. 632.451.2:576.16:633.15
The relative effect of environmental and genetic factors on growth types of *Ustilago zeae*.
Phytopathology 1942 : **32** : 554–67.
The results of an earlier work are confirmed, and this continued investigation concerns (1) environmental factors that might change intermediate lines, and (2) the effect of environmental factors not previously dealt with on sporidial and mycelial lines.

132. Flor, H. H. 632.452:576.16:575.114:633.52
Inheritance of pathogenicity in *Melampsora lini*.
Phytopathology 1942 : **32** : 653–69.
The pathogenic characters of physiological races of the flax rust fungus (*Melampsora lini*) obtained by selfing and hybridizing could be accounted for by Mendelian segregation and recombination of pathogenic characters inherent in the parent races. Avirulence was invariably dominant in crosses. The range of pathogenicity of a physiological race is determined by pathogenic factors specific for each resistance factor possessed by the host variety. E. K. J.

133. Hassebrauk, K. 632.452:576.16:633.11
Mit Hilfe neuer Testsorten durchgeführte Untersuchungen über die physiologische Spezialisierung von *Puccinia triticina* Erikss. (**Investigations on the physiological specialization of *P. triticina* Erikss. carried out with the help of new test varieties**).
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1940 : **23** : 37–51.
By testing the brown rust races on a wider range of differential hosts the existing races were shown to be composite groups. A new set of differential hosts has therefore been devised, consisting of the following varieties: Mettes Rauhweizen, Weisser Kolbenspelz, Rüfenach 6, Roter Tiroler Spelz, Rottweiler Dinkel rot St. VI, Sizilianischer Binkel, Loosdorfer 111, Svalöfs Sonnen I, Hildebrandts Weisser Viktoria, Köstlins Hohenheimer Bastard, Jägers Albweizen, Abundance Gold coin a and Malakoff. In this way 45 new physiological forms have been established. The author expresses the opinion that the differential hosts most suitable for distinguishing the races of one country are not necessarily most suitable for another country; and that *P. triticina* may ultimately prove to be one of those parasites in which the biological specialization is so complex that it is unprofitable to study it.

134. Armstrong, G. M.,
Hawkins, B. S. and
Bennett, C. C. 632.484:576.16:633
Cross inoculations with isolates of Fusaria from cotton, tobacco, and certain other plants subject to wilt.
Phytopathology 1942 : **32** : 685–98.
Cross inoculation with wilt Fusaria from *Cassia tora*, tobacco, cotton, okra, tomato, watermelon and cowpea showed that while those attacking the last three were pathogenic only to their respective hosts, isolates from *Cassia*, tobacco, cotton and okra caused wilt in one or more other hosts. E. K. J.

135. Johnston, C. L. and
Greaney, F. J. 632.484:633.11:576.16
Studies on the pathogenicity of *Fusarium* species associated with root rot of wheat.
Phytopathology 1942 : **32** : 670–84.
Experiments in the greenhouse to determine the pathogenicity to wheat of 24 isolates of the root

rot fungus *Fusarium culmorum* showed that only one was distinctly pathogenic. No marked pathogenicity was exhibited by isolates of *F. redolens*, *F. oxysporum*, *F. avenaceum* and *F. eguseti* studied.
The presence of the soil fungus *Trichoderma lignorum* and *Pyronema confluens* suppressed the pathogenicity of the virulent *F. culmorum*. E. K. J.

136. Brunson, A. M. 632.7–1.521.6
Cooperation of agronomists and entomologists in plant breeding studies on resistance and tolerance to insects.
North. Cent. States Ent. Proc. 1940 : No. 19 : 28–29.
The importance of cooperative work between agronomists, botanists and entomologists in plant breeding studies on resistance and tolerance to insects is discussed. E. K. J.

137. Blanchard, R. A. et al. 632.7–1.521.6:575
Developments and methods in plant breeding studies as they relate to insect resistant crops.
North Cent. States Ent. Proc. 1940 : No. 19 : 33–38.
The report given is the result of co-operation between entomologists and agronomists. A list is given of varieties of maize, sorghum, wheat and grass species resistant to the following pests: corn ear worm, chinch bug, southern root rot worm, grasshoppers, European corn borer, Hessian fly. The expression of resistance was found to be influenced by environmental factors like temperature and the breeding programme for development of varieties resistant to each of these pests calls for basic information on the races of the insects and the other environmental factors under which the crops are grown. Such a programme is outlined.
E. K. J.

138. Marshak, A. and
Takahashi, W. N. 632.8:575.243:537.531
The effect of pH on inactivation of tobacco mosaic virus by X-rays.
Proc. Nat. Acad. Sci. Wash. 1942 : **28** : 211–16.
Suspensions of the virus in MacIllvaine buffers of varying pH values were irradiated with X-rays and compared with unirradiated controls in their effect on *Nicotiana glutinosa*. The results show that from pH 4·0 to 7·0 the efficiency of the X-rays remains unchanged but from pH 2·2 to 3 the efficiency is significantly increased. It is concluded that more of the electrons produced by X-rays reach the virus particles when they carry a net positive charge than when the charge is negative.

139. Khvostova, V. V. and
Goldat, S. J. 632.951.1:576.356.5:581.04
Colchicine induced tetraploids in chrysanthemum.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 623–24.
C. (*Pyrethrum*) *cinerariaefolium*, *C. carneum* and *C. roseum* all contain pyrethrin. All chrysanthemum species that form pyrethrin are perennial. The production of tetraploids of these species is highly desirable, as they would have larger flowers and pyrethrin is mainly found in the tubular florets; also, tetraploid plants are believed to have a higher content of certain chemical substances than diploids.
In order to obtain results more rapidly the authors used the annual species *C. segetum*, *C. coronarium* and *C. viscosum* which also contain traces of pyrethrin as well as the perennial species above mentioned.
Colchicine solutions of concentrations from 0·01 to 0·2% were applied to growing plants and seeds. With concentrations of 0·2% and 0·1% the perennials failed to root; and they ceased growth after application to growing plants of concentrations of 0·2%. The annuals, on the other hand, gave good results in both cases.
Tetraploids were identified by the size of stomata of pollen grains and plants with increased size of pollen were examined for the chromosome number.
The progeny of all three annual species contained plants with increased chromosome number.

Most of the 25 plants in the progeny from one treated plant of *C. segetum* proved to be tetraploid, 3 or 4 were triploid, and 2 diploid. Two tetraploids were found among the seeds from treated plants of *C. coronarium* and one triploid (from the union of a diploid gamete with a normal haploid one) in *C. viscosum*.

As compared with the diploids the tetraploids had thicker stems and leaves, longer and broader leaf lobes, larger tubular florets and a longer head diameter (without the ray florets). In the diploids and tetraploids the ray florets are of the same size.

Examination of the flowers, stems and leaves suggested that the percentage of pyrethrin in the tetraploids is double that of the diploids, though it is admitted that the substance obtained may not be pyrethrin but some ester similar to pyrethrin though not toxic.

The Caucasian chrysanthemums *C. carneum* and *C. roseum* contained up to 0·8% of pyrethrin I and gave a well marked qualitative reaction; but it is unlikely that forms of practical value could be obtained from annuals. The tetraploids showed no reduction in fertility and if similar characteristics could be obtained in perennial tetraploids, such plants would be of direct practical importance. But the production of tetraploid seeds in perennial plants is very difficult as they are self-sterile cross-fertilizers and develop much more slowly.

One plant of *C. carneum* gave several triploid seeds.

Subsequently many plants of the 3 toxic species *C. cinerariaefolium*, *C. carneum* and *C. roseum* were obtained that phenotypically appear to be tetraploids. These and other new forms are to be studied.

140. Little, V. A. 632.951.1:581.6:575
Rotenone content, an inherited character in the roots of devil's shoestring, *Tephrosia virginiana*.
J. Econ. Ent. 1942 : **35** : 54–57.

Ginsburg, J. M.,
Schmitt, J. B. and
Reid, T. S.
A rotenone-bearing variety of *Tephrosia virginiana* in New Jersey.
Ibid 1942 : **35** : 276–80.

It has been demonstrated that highly toxic plants when isolated tend to produce offspring of similar toxicity, thus showing that the dominant factor in the formation of rotenone and related compounds in the parent is heritable. It is concluded that highly toxic strains of *T. virginiana* can be bred.

ECONOMIC PLANTS 633

141. Vasconcellos, J. de Carvalho e 633–1.524(46.9)
Estudo das formas cultivadas. **(Study of cultivated forms).**
Rev. Agron. Lisboa 1941 : **29** : 462–67.

This is the full form of the paper (see "Plant Breeding Abstracts", Vol. XII, Abst. 1016).

CEREALS 633.1

142. Atkins, I. M. and
Mangelsdorf, P. C. 633.1:575.114
The isolation of isogenic lines as a means of measuring the effects of awns and other characters in small grains.
J. Amer. Soc. Agron. 1942 : **34** : 667–68.

When homozygosity has been achieved by selection in all genes except those governing awns, the awned and awnless segregates are to be isolated from a number of different lines. This procedure is discussed, and is being used for barley in a comparison of hooded versus smooth awns, hooded versus rough awns and rough versus smooth awns. It is applicable to any situation where the expression of a character is dependent primarily on one pair of genes, and is especially useful when the heterozygote is easily identified and self fertilization is the mode of reproduction.

143. Clark, J. A. and
Quisenberry, K. S. 633.11(73)
Distribution of the varieties and classes of wheat in the United States in 1939.
Circ. U.S. Dep. Agric. 1942 : No. 634 : Pp. 75.
The percentage of total wheat acreage occupied by the different varieties in 1939 is listed.
E. K. J.

144. Nevano, G. 633.11:575(45)
Due nuove razze elette di frumento: "Anna Nevano" ed "Ariano Irpino". **(Two élite races of wheat, Anna Nevano and Ariano Irpino).**
Ital. Agric. 1942 : **79** : 42–45.
The local wheat Risciola, though good in quality and resistant to rust, is apt to lodge under improved soil conditions and was crossed with Damiano Chiesa in 1934; selections were made during successive generations and 5 F_6 plants gave rise to the new variety Anna Nevano, which is described and illustrated. In time of maturity it is intermediate between the two parents, and it is rust resistant; it yields well, producing in average conditions 20 quintals per hectare as against 8–10 for the old local wheats; it responds well to more fertile soils. The quality is excellent.
Ariano Irpino is a selection from a spontaneous hybrid of Risciola, probably with Ardito. This variety, which is also described and illustrated, is somewhat earlier than the ancient local races; it is resistant to rust and lodging and fairly productive, being less exacting than Anna Nevano as regards soil. Its quality is described as good.

145. 633.11:575(45)
Vannuccini, G. 635.64:575(45)
Nazareno Strampelli e le sue creazioni. (**N. Strampelli and his creations**).
Ital. Agric. 1942 : **79** : 121–26.
An outline is given of the late N. Strampelli's work on the improvement of Rieti wheat by crossing with other varieties, species and genera. The most famous of his wheat varieties, many of them distinguished by very early maturity, are illustrated in colour. Mention is made also of 2 new tomatoes produced by Strampelli, namely Fundania and Varrone.

146. 633.11:575(49.7)
Pavlov, K. 633.11–2.4–1.521.6
Wheat No. 11—Agronomic and botanical description.
Rev. Inst. Rech. Agron. Bulg. 1939 : **9** : No. 4 : 45–78.
This new variety is becoming widely grown in S. Western Bulgaria where wheat is increasing in importance as compared with rye or rye-wheat mixtures.
Wheat No. 11, which was created by the Agricultural Research Institute (Sofia) is a pure line obtained by individual selection from a population of local unimproved wheat. Ultimately included in variety trials with strains from the Ruse and the Sofia Experiment Stations, No. 11 proved one of the best as regards yield and quality and was later multiplied up for the distribution of seed in various districts in S. Western Bulgaria.
It is a white eared, awned red wheat belonging to the variety *Triticum vulgare*, var. *erythrospermum* Vill. The leaves are relatively small and narrow, the straw thin, hollow and weak and the ear is not very dense (containing about 30 grains). Tillering capacity is average and the plants are resistant to drought and winter conditions, have a short vegetative period and start growth early in the spring.
Detailed descriptions are given of the leaf, stem, ear and the biological and economic features of the plant.
No. 11 varies in its resistance to *Puccinia graminis, P. triticina* and *P. glumarum* and also in its resistance to the different races of the same species. The following facts emerge from Dr. Dodov's research on its physiological resistance to three species of rust.

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* See also Absts. 79, 82, 83 and 85.

No. 11 is highly resistant to two out of the three species of *P. glumarum* known in Bulgaria and susceptible to the third. It is susceptible to all 12 races of *P. triticina* known in Bulgaria, while as regards *P. graminis* it shows good resistance to five and moderate resistance to one of the 13 races in Bulgaria but it is highly susceptible to the remaining seven races. In the field, however, No. 11 shows considerable resistance to *P. graminis* and *P. glumarum*, while exhibiting relatively weak resistance to *P. triticina*. To *Tilletia* species it is pretty susceptible; but to *Ustilago tritici* it is completely resistant in the field. Particulars are also given about the resistance of other wheat strains to these fungi.
No. 11 is not subject to shedding, which however makes threshing more difficult, if harvesting is left too late; a minor fault is that the ear tends to become fragile if ripening is allowed to go on too long.
The yields and baking qualities of the new wheat are compared with those from local Bulgarian wheats and other improved varieties in the country.
The most suitable regions of cultivation for wheat No. 11 are discussed.

147. Saltykovsky, M. I. and Sapryguina, E. S. 633.11:575"793"
Winterness in the second generation of wheat hybrids.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 628–31.

In the course of research on winter hardiness in wheat hybrids derived from crosses of each of a number of spring varieties with a series of winter varieties, the number of winter forms in the F_2 was observed to vary according to the winter parent involved. A study of the inheritance of winter habit was therefore undertaken and the following conclusions reached:—
When a set of different spring forms, all having a short vernalization phase but varying in length of the phase were crossed with a single winter variety the F_2 segregation of winter forms showed unmistakable regularity, being related to the length of the light phase of the spring parents. In this group of hybrids the number of winter forms was higher, the longer the light phase of the spring parent.
When one spring variety was crossed with a set of different winter wheats, the F_2 segregation of winter forms depended markedly on the length of the developmental phases of the winter parents, the proportion being higher, the longer the two developmental phases of the winter parent.
The number of winter forms obtained in F_2 depends on the length of the two developmental phases and this relationship is more pronounced when one winter variety is crossed with a number of spring varieties widely differing in the length of their light phases than when one spring variety is crossed with a number of winter varieties differing in the vernalization phase. In the first case the ratio of winter forms obtained when the spring parent has a long light phase is ten times that obtained when the spring parent has a short light phase.
Combinations in which both parents had a short light phase gave the fewest winter forms and the highest proportion of such forms was obtained when the spring parents had a long light phase and in the winter parents both phases were long.
Further work with F_3 and F_4 hybrids has shown that the vernalization phase of segregated winter forms can be lengthened by crossing spring forms having long light phases with winter forms.
The proportion of winter forms segregated depends on the temperature prevailing during the developmental period. More plants that fail to form ears occur among hybrids sown at late dates than among early planted hybrids -a phenomenon that could, it is suggested, be utilized in the selection of homozygous early forms in breeding operations.

148. Zhebrak, A. R. 633.11:575.127.2:575.129
Colchicine induced amphidiploids of *Triticum turgidum* x *Triticum Timopheevi*.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 617–19.

Because of its high yield and large number of grains per spike and per spikelet *T. turgidum* was pollinated by *T. Timopheevi*, the variety *rubriatum* from Bavaria, No. 20777, being used to form one combination and variety *Herrerae* and variety *Dreischianum*, two other combinations. The hybrid seed obtained was treated with colchicine and it was found that in crosses in which repeated applications had been made a very high number of amphidiploid spikes and

seeds could be ensured, e.g. in six experiments plants with only amphidiploid spikes were obtained. On the other hand in one experiment in which weak solutions of colchicine were used no amphidiploid spikes were obtained.
A high number of grains per spikelet was obtained in the cross with variety *rubriatum*, the best spikes containing 20–21 grains with an average of 3·15 grains per spikelet. In yield this hybrid was but slightly inferior to the parent species. The kernel of the amphidiploid is longer than that of *T. turgidum* but shorter as compared with *T. Timopheevi*; it is somewhat asymmetrical and not very well filled. The weight of 1,000 grains was estimated as 61·8 grm. In root tips of 2 plants the chromosome number proved to be $2n = 56$.
The amphidiploids of *T. Timopheevi* with different varieties of *T. turgidum* differ greatly in spike and grain indices and in other respects and the *T. turgidum* x *T. Timopheevi* amphidiploids rank, according to the author, as an independent 56-chromosome species, *T. sovieticum* and those among them obtained from different varieties of *T. turgidum* are considered as different varieties and strains of that species. The number of sub-species, varieties and strains within *T. sovieticum* is likely to be augmented as amphidiploids from new species, varieties and strains of 28-chromosome wheats are obtained from time to time.
T. turgidum var. *rubriatum* x *T. Timopheevi* amphidiploids are regarded as representing a spring form in which the winter habit of variety *rubriatum* is latent as a recessive character. A few practical hints on technique are given.

149. Smith, L. 633.11:575.243:537.531:575.113
Hereditary susceptibility to X-ray injury in *Triticum monococcum*.
Amer. J. Bot. 1942 : **29** : 189–92.
"A mendelian factor was found in einkorn wheat which distinctly increased the susceptibility of dormant seeds to X-ray injury. In preliminary tests the factor had no apparent effect on mutation rate nor on susceptibility to heat injury".

150. Lavrušin, M. 633.11:581.19(47)
(Zoning of varieties of winter wheat).
Sotsialističeskoe Sel'skoe Khozjaistvo (Socialistic Agriculture) Moscow 1941 : Nos 7–8 : 88–90.
The State Committee for Variety Trials of Cereal Crops in the U.S.S.R. has in the space of 3 years conducted trials of about 6,000 varieties of 19 different crops in addition to plot trials covering annually over 2,000 of the best local varieties and populations. Foreign varieties numbering 566 mainly from U.S.A., Canada, and Sweden and including 124 varieties of winter wheat have also been tested. In the light of the results obtained the Committee planned for 1941 the regional distribution of varieties to suitable zones throughout the Union, 328 zones in all having been selected. Three classes of varieties are recognized in allotting the varieties—(1) principal varieties (which may include commercial varieties as well as new recently bred forms and local forms), regarded as the best and most suited to the requirements of the region; (2) varieties whose use is permitted; and (3) those temporarily permitted.
Considering the Committee's findings only as regards winter wheat, the following selections merit attention.
Krasnodarka, which is recommended for the humid regions of the Caucasus, is resistant to rust and smut as well as to lodging and shedding and has outyielded Ukrainka and Stavropolka, to which varieties, however, it is inferior in grain quality.
The new variety Vorošilovskaja (a selection from Kanred x Fulcaster 266287) is allotted to the southern part of the Rostov region, 3 zones in the Krasnodar district and 2 arid zones of the Ordžonikidze district and to the Crimea. It has also been recommended for larger scale tests of its agricultural merits in the Ukraine. It is an early maturing form resistant to rust, smut and drought and has given good yields but is below average in winter hardiness.
Among other varieties allotted to the Ukraine are Erythrospermum 15 and Lutescens 17.
The variety Odessa 3 which is winter-hardy should be of great importance for the southern and eastern Ukraine. In yield it has surpassed Ukrainka and it is resistant to smut, but susceptible to brown rust.
The new variety Lutescens 1866 has been selected for the White Russian Republic. It is awnless and more winter-hardy than Moscow 2453.

Out of 20 new varieties selected for combinations of desirable characteristics and recommended for large scale trials of their agricultural merits Ul'janovka, Erythrospermum 529, Lutescens 116 and Lesostepka 75 deserve special mention.

151. Almeida, J. M. de 633.11:581.46:575.11
Acêrca da hereditariedade do carácter "dente apical das glumas" no trigo.
(**The inheritance of the character "apical glume tooth" in wheat**).
Agron. Lusitana 1940 : **2** : 233–42.

The glume tooth is longer in many awned wheats than in awnless forms and the same correlation was observed in the awned and awnless segregates of the cross Lin Calel (awned) x Vogtländer braun (awnless). Some of the awned segregates had glume teeth up to 20 mm. in length, though the maximum in the awned parent was 8 mm. The length of the glume tooth varied independently of the length of the awn, the correlation between the two being $r = 0{\cdot}112$.

Similar results were observed in the cross Minhardi x Criewener 27. The increases in glume tooth length, and its variation, are ascribed to the action of modifying factors introduced by the awnless parent which cannot be manifested in the presence of the factor for awnlessness.

152. Oliva, A. 633.11–2.111–1.521.6:575(45)
La resistenza al freddo dei frumenti montani nel collaudo invernale 1941–42.
(**The cold resistance of the mountain wheats in the winter test of 1941–42**).
Ital. Agric. 1942 : **79** : 290–93.

The exceptionally severe winter of 1941–42 showed up certain wheat varieties as being truly hardy, and capable therefore of being cultivated at higher altitudes than before. The various aspects of cold resistance in plants and the factors that influence it are discussed. The new variety Est, which has been selected in the actual mountain zones, is regarded as one of the hardiest and most promising.

OATS 633.13*

153. Adair, E. O. 633.13–2–1.521.6:575(76.7)
Arkansas oat hybrid shows great promise. Extensive field trials prove DeSoto has marked resistance to rust and smut in addition to being high-yielding strain.
Sth. Seedsman 1942 : **5** : No. 8 : 7, 31.

Describes a new hybrid oat "DeSoto" selected from a cross between the Argentine variety "Victoria" and the "Lee," a winter hardy strain. It is resistant to both crown rust and smut and to winter injury. E. K. J.

154. Coffman, F. A. 633.13–2.111–1.521.6:575(73)
Survival of oats grown in winterhardiness nurseries, 1937 to 1941.
J. Amer. Soc. Agron. 1942 : **34** : 651–58.

Results from the uniform winter hardiness oat nurseries for the period 1927–36 have been published (see "Plant Breeding Abstracts", Vol. VII, Abst. 1236, also Vol. VIII, Abst. 132, and U.S.D.A. Circ. 622, 1941). The present paper reports data obtained in 135 of the 164 tests in which differential killing has occurred in 5 years since 1936. A total of 58 varieties and selections (belonging to *Avena sativa* and *A. byzantina*) was listed. The possibility that increased hardiness in oats may be obtained by species hybridization is substantiated and it appears that most of the genes for cold resistance may be found among the red oats.

RYE 633.14†

155. Prakken, R. and Müntzing, A. 633.14:576.356:575.11
A meiotic peculiarity in rye, simulating a terminal centromere.
Hereditas, Lund 1942 : **28** : 441–82.

Curious chromosomes, referred to as T-chromosomes, in which the end behaves in many ways like a terminal centromere have been found in 4 inbred lines of Stalråg (Steel rye) and their behaviour is described. The phenomenon was observed with varying intensity in the different

* See also Absts 79 and 82. † See also Abst. 79.

lines, and in two plants of one line it was not restricted to 1 chromosome but might affect as many as 6 out of the 7.
In crosses between 2 lines showing the T-phenomenon in different intensities the F_1 plants tended to be intermediate in intensity; in crosses with normal lines the phenomenon occurred in very much reduced intensity; occasional heteromorphic chromosomes could be detected with very variable frequency.
Among the F_1 plants two individuals were found to have an association of four chromosomes in almost all the p.m.c., and in the progeny of a single isolated plant of line 129 one plant was found to be triploid ($2n = 21$). This plant had 3 T-chromosomes.
No trace of the T-phenomenon could be detected in mitosis, even in the lines of the highest intensity. The behaviour of the T-chromosomes is discussed; the author concludes that the T-end does not possess a true centromere and that its typical reaction consists in an attraction to the nearer pole, thus differing from the interpretation given by Kattermann to a similar phenomenon (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 126). The heterozygous F_1 plants never showed more than two chromatid ends with the T-character, and therefore this T-character is supposed to be due to a structural change. In some hybrids a large blob was often seen at the end of one of the T-chromosomes and when they become detached these blobs are vigorously attracted to the pole.

156. KOTTHOFF, P. 633.14–2.6–1.521.6:575(43)
Die Resistenz von Roggensorten gegen *Anguillulina* (*Ditylenchus*) *dipsaci* (Kühn). [**The resistance of rye varieties to *A.* (*Ditylenchus*) *dipsaci* (Kühn)**].
Angew. Bot. 1942 : **24** : 79–99.

Previous work on the subject is discussed and it is pointed out that the percentage infestation does not necessarily indicate the amount of economic damage which is represented by the reduction in yield and depends not only on the degree of infestation but also on the capacity for recovery of the plants attacked as well as the space and nutriment available to the survivors and may therefore differ among varieties with different growth rhythms. For this reason the author undertook a survey, from the economic standpoint, of the reaction of varieties to infestation in a series of replicated plots that would ensure as far as possible comparable yield determinations. The method, precautions and plant material are described. Large numbers of perennial varieties of rye and land forms (or supposed land forms) were investigated as well as pedigree varieties obtained by selection or breeding. The plant material consisted of types from Germany, Austria, Hungary, Montenegro, Spain, Switzerland, Finland, Russia in Europe, Siberia, Turkestan and Asia Minor, supplied by breeders and institutes in Germany and Russia.
The resistant Lower Rhenish rye was used as a control. Yields were recorded only at Brockhagen but not at Sythen (in Recklinghausen) where infestation alone was reckoned.
The results, which are given in detail, showed that the Lower Rhenish rye and Pulder rye alone possessed true resistance which is unaffected by external conditions.
These two ryes have various economically undesirable features but they could be improved by selection for increased resistance and yield or by crossing with more productive varieties. Many years' selection of externally healthy plants to improve resistance met, however, with no success. Stieltjes in Holland has apparently been more successful with crosses between Petkus rye and Ottersum; but the resulting hybrid "Tolerant Winter Rye", which is recommended for nematode infected soils, has not yet been tested by the author. The problem of breeding a suitable type for Germany has not been solved, mainly because the area requiring such a type is limited, involving only certain regions of Western Germany.
Small scale resistance trials were also conducted with oats (50 varieties) and three varieties of spring rye.

MAIZE 633.15*

157. MORRISON, G. 633.15:575
The story of sweet corn and some of the leading varieties—their uses and adaptabilities.
Nat. Seedsman 1941 : **8** (2) : 22–23.

Golden Cross Bantam represents the nearest ideal combination of wide adaptability, high yield and quality in sweet corn.

*See also Absts 82 and 85.

Other varieties recommended are: Golden Bantam for earliness, Charlevoix and Black Mexican for delicacy of flavour and Crosby and Country Gentleman for quality. E. K. J.

158. Enzie, W. D. 633.15:575.12
The relation of spacing to yield and to plant and ear development of some yellow sweet corn hybrids in New York.
Bull. N.Y. St. Agric. Exp. Sta. 1942 : No. 700 : Pp. 19.
The varieties studied were Seneca Golden, Tendergold and Golden Cross. Changes in yield effected by spacing led to a study of plant and ear characters in which the features maturity, plant height, tillering, double-earedness and ear lengths have been measured.

159. Venta, J. de la 633.15:575.12(46)
La mejora genética del maíz. (**Genetic improvement of maize**).
Agricultura, Madrid 1941 : **10** : 7–10.
The seed at present used in most Spanish maize fields is distinctly inferior and the various possible methods of improvement are outlined; these include mass selection, crossing of selected plants, and double and single crosses of inbred lines. By the use of double crossed seed, yields of 4, 5 and up to 8 thousand kg. have been obtained on estates where the ordinary seed yields only 3 thousand kg. Two such hybrids, named Pepita de Oro [Golden Pippin] and Reina Blanca [White Queen] have been distributed by the Misión Biológica de Galicia.

160. Jenkins, M. T. (Compiler) 633.15:575.12(73)
Results of the cooperative uniform comparisons of corn hybrids, 1941.
Div. Cereal Crops Dis., Bur. Pl. Ind., U.S. Dep. Agric. 1942 : Pp. 81. (Mimeographed).
"This is the ninth annual report presenting the results of the cooperative uniform comparisons of corn hybrids. For the first time since 1933, when the tests were organized, they were comprised entirely of single crosses. Three uniform tests were conducted during the season of 1941, an early, a midseason, and a late white. Each test, except the midseason one, contained 45 entries, all of the possible single-cross combinations among a group of 10 selected inbred lines. Two of the 45 single crosses among the midseason lines were not tested because their parental lines were closely related. The data on the average performance of the single crosses in each group of uniform tests have been used to compute the predicted performance of all of the 630 possible double crosses among their 10 parental inbred lines. These predicted data, for the 90 double crosses from each test with the highest predicted yields, are presented along with other data from the tests".

161. Shafer, J. (jun.) 633.15:575.12:581.1
Water loss from excised leaves.
Amer. J. Bot. 1942 : **29** : 89–91.
In studies of physiological differences between various inbred and hybrid strains of *Zea mays* L., no real differences between strains with regard to water loss were found.

162. Smith, G. M. 633.15:575.125(73)
Sweet corn hybrids, 1940.
Canner 1941 : **92** (12) : p. 54.
Huelson, W. A.
Sweet corn hybrids, 1940—the outlook for the canner.
Canner 1941 : **92** (12) : p. 54.
The new Country Gentleman hybrids yield from 20 to 50% more than the best older hybrids and are measurably better in quality. Efforts are being made to breed ear-worm resistant hybrids for canners.

163. Robbins, W. J. 633.15:575.125:577.17
Factor Z in hybrid maize.
Bull. Torrey Bot. Cl. 1941 : **68** : 222–28.
Extracts of the grains of two inbred strains of maize and their F_1 hybrid were found to increase the early growth of *Phycomyces* in solutions of sugar, minerals, asparagine and thiamin.

The extract of the F_1 hybrid, which showed heterosis, produced a greater effect per grain, per embryo and per endosperm than that of either of the parents. E. K. J.

164. 633.15:575.14:578.08
BEARD, D. F. 633.15–2.482–1.521.6:575.14
Relative values of unrelated single crosses and an open-pollinated variety as testers of inbred lines of corn.
Abstr. Doct. Diss. Ohio Univ. 1940 : No. 33 : 9–18.

Seven inbred lines of maize were crossed with each of three test varieties, one an open-pollinated sort, Eichelberger Clarage and the other two single crosses, 56 x Hy and 73B x Mc401. The 21 crosses so obtained were studied with respect to plant height, maturity, lodging, smut infection and yield. It was concluded that single crosses are at least as good as open-pollinated varieties for testing inbreds and offer certain definite advantages, which result from their greater uniformity. It is suggested that high-yielding single crosses, ideally heterozygous for all the yield genes, would be the best testers; low-yielding single-crosses would be unreliable, since the few yield genes for which they are heterozygous might or might not be the same as those in the inbreds tested, and the degree of relationship would affect the amount of hybrid vigour manifested.

In a second series of experiments susceptibility to *Diplodia zeae* was studied in a number of inbreds and their single crosses and top-crosses. A correlation of +·77 was observed between the susceptibility of inbreds and of their respective top-crosses. The degree of susceptibility of hybrid combinations may thus be predicted from the performance of the constituent inbreds. The ranking of different inbreds with regard to susceptibility was significantly affected by the location of the trial. S. E.

165. STADLER, L. J. and
UBER, F. M. 633.15:575.243:535.61–31
Genetic effects of ultraviolet radiation in maize. IV. Comparison of monochromatic radiations.
Genetics 1942 : **27** : 84–118.

The effectiveness of different wave lengths of ultra-violet radiation and different dosages in producing mutations in maize pollen (the mutations studied were embryo abortion and endosperm deficiencies for the dominant marker genes, *A*, *Su* and *Pr*) was investigated. In general the number of mutations produced by large doses is less than that which could be expected on a linear relationship and the tendency for the dosage curve to level at the larger doses is more pronounced at lower wave lengths than at higher. It was also found that double dose, half of it being applied from each side, gave many more mutations that a double dose all applied from the same side, e.g. single dose from one side, 14·7% mutations; double dose from one side 19·8%; and double dose, one half from each side, 33·8%. This is due to the gametic nuclei within the pollen grain being eccentrically located. Calculations of the form of the dosage curve to be expected at each wave length, using observed values for the position of the nuclei within the pollen grain and for the transmission losses in pollen wall and contents, and assuming that the effectiveness of each wave length per unit of energy is constant, were made and found to agree fairly closely with the observed values. The effectiveness per unit of energy reaching the nucleus was determined for nine wave lengths and these values were found to agree with the relative absorption coefficients of nucleic acid for the same wave lengths. H. W. H.

166. SASS, J. E. and
SPRAGUE, G. F. 633.15:575.243:581.481:535.61–31
A "twin-embryo" abnormality in maize.
Proc. Iowa Acad. Sci. 1940 : **47** : 155–56.

A mutant strain of maize obtained by ultra-violet treatment has twin growing points in the embryo.

167. RHOADES, M. M. 633.15:576.312.34:575.114:581.331.23
Preferential segregation in maize.
Genetics 1942 : **27** : 395–407.

An abnormal type of chromosome 10 found by Longley (see "Plant Breeding Abstracts", Vol. VIII, Absts 136 and 1189) is preferentially segregated during megasporogenesis. Pollen

with the abnormal chromosome 10 is only partially successful in competing with pollen possessing a normal chromosome 10. It is suggested that extra chromatin in the abnormal chromosome produces a deleterious effect on pollen tube growth.
The influence of environment on the degree of preferential segregration is discussed.

168. Kemmerer, A. R.,
Fraps, G. S. and
Mangelsdorf, P. C. 633.15:577.16:575.11.061.6
The relation between the vitamin-A-active carotenoids in corn and the number of genes for yellow color.
Cereal Chem. 1942 : **19** : 525–28.
The number of genes for yellow colour in corn was found to affect directly the amount of vitamin A active carotenoid pigment but did not affect appreciably the relative proportions of the different constituents alpha, beta, and K carotene and cryptoxanthin. E. K. J.

169. Elliott, C. 633.15–2.411.4–1.521.6
Relative susceptibility to *Pythium* root rot of twelve dent corn inbreds.
J. Agric. Res. 1942 : **64** : 711–23.
Twelve inbred lines were studied in two years, the results being consistent from year to year. Ia. L.317 was the most resistant to *Pythium arrhenomanes*, and C.I.1 the most susceptible.
S. E.

170. Flint, W. P.,
Dungan, G. H.,
Bigger, J. H. and
Young, A. L. 633.15–2.7–1.521.6:575
Corn-borer control. A three-point program.
Circ. Univ. Ill. 1942 : No. 521 : Pp. 12.
Work done with inbred and single crosses at the Illinois and Ohio Stations since 1938 and tests made in Ohio have produced inbred varieties which may be classified as resistant or susceptible to the corn borer.
The characteristics required in a resistant strain are delayed emergence of the tassel, slow early development and rapid late development of the plant, together with relatively late maturity. The value of delayed planting is noted.

171. Schlosberg, M. 633.15–2.7–1.521.6:575(73)
Sweet corn resistance to the European corn borer.
Canner 1941 : **92** (12) : 54–56.
During the six years from 1935 to 1940 between 1,700 and 1,800 items were tested by uniform hand infestation. None of the inbred strains has been found immune to the establishment of larval populations in the plant but some have shown consistently low infestations, which were in some cases apparent also in their progeny. Hybrids between two resistant parents showed the lowest infestation.

172. Patch, L. H.,
Holbert, J. R. and
Everly, R. T. 633.15–2.7–1.521.6:575.12
Strains of field corn resistant to the survival of the European corn borer.
Tech. Bull. U.S. Dep. Agric. 1942 : No. 823 : Pp. 22.
The relative resistance to survival of *Pyrausta nubilalis* contributed by inbred lines of field corn to hybrid combinations has been studied. Data supplied indicate that there is little advantage in testing sister strains in future experiments, that there is a trend from pronounced borer resistance towards borer susceptibility when the number of partially resistant and susceptible inbreds used in the pedigrees was increased, and that there is a cumulative effect of an undetermined number of multiple factors in inbred lines which produce borer resistance in hybrids.

173. Haber, E. S. and Gaessler, W. G. 633.15–2.7–1.521.6:581.6
Sugar content of sweet corn pollen and kernels of inbred and hybrid strains susceptible to tassel infestation by aphis.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 429–31.

The investigations have shown that while the percentage of total sugars present varied in different lines, there was no correlation between aphis susceptibility and the amount of sugar present.
Under conditions at Ames, Iowa in 1941, tassel infestation by aphis was not the result of high sugar content of the pollen, nor is the sugar content of the pollen correlated with sugar content of kernels at the edible stage.

BARLEY 633.16*

174. Atkins, I. M. and Dunkle, P. B. 633.16:575(76.4)
Barley production in Texas.
Bull. Tex. Agric. Exp. Sta. 1941 : No. 605 : Pp. 35.

Data on two new *Hordeum* varieties, Texan and Wintex, adapted to Texas conditions are recorded. The first named was selected from a hybrid derived from several crosses and is smooth awned, earlier than Wintex and resistant to mildew. The second new form has already been described (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 987).

175. Leonard, W. H. 633.16:575.11:581.46:575.116
Inheritance of fertility in the lateral spikelets of barley.
Genetics 1942 : **27** : 299–316.

From crosses with Nigrinudum (*VVII*), Nudideficiens (*VVii*) and Coast II (*vvII*), Nudihaxtoni was found to have the constitution *vvII*; Sublaxum the constitution *VVii* and Mortoni the constitution *VV*—where *Vv* is the factor pair for non-six-row versus six-row and *Ii* the factor pair for intermedium versus non-intermedium condition. The intermedium versus non-intermedium condition in Mortoni may be different from that in the other lines mentioned. Partial fertility of the lateral spikelets was only found in F_1's of the constitution *VvII*. Further studies of crosses involving Mortoni suggest that this variety has a constitution VVI^hI^h. In these crosses the genotypes *VVII* and $VVII^h$ are infertile intermediums, the genotypes *VvII*, $VvII^h$ and VvI^hI^h are fertile intermediates, VVI^hI^h is fertile intermedium and *vvII*, $vvII^h$ and vvI^hI^h are six-row types. The factor pair for non-intermedium versus fertile intermedium (I^hi) was found to be linked with *Kh* (hoods versus awns) in group IV, the cross-over percentage being 14·3—this confirms the existence of an allelic series, *I*, I^h, *i*. It was not linked with factors in groups I, II, III, V and VI. H. W. H.

176. Woodward, R. W. 633.16:575.113.3.061.6
Linkage relationships between the allelomorphic series B, B^{mb}, B^g, and A_ta_t factors in barley.
J. Amer. Soc. Agron. 1942 : **34** : 659–61.

The albino factor found in Trebi I appeared to be the only suitable factor for making linkage studies with the black and white factor pair. Linkage relationships and the percentage of recombinations were derived by the formula $P^2 = \frac{\text{Black 2-(White)}}{\text{Total}}$. Four separate crosses, representing the 4 black allelomorphic colour classes previously described (see "Plant Breeding Abstracts", Vol. XII, Abst. 158) were made up of 14 families and over 6,000 F_2 plants. The cross-over values for individual families ranged from 30·3 to 42·3, and for the 4 different crosses from 35·0 to 39·2, an average of 36·7%. Results favour the theory that the black classes form an allelomorphic series with a cross-over value near 36·7%.

177. Gustafsson, Å. 633.16:581.174:575.242.061.633
The plastid development in various types of chlorophyll mutations.
Hereditas, Lund 1942 : **28** : 483–92.

Studies were made of the plastids in various chlorophyll deficient X-ray mutants of Golden

* See also Absts 79, 82 and 83.

barley. It was found that *albina* types usually contain very small, scarce plastids, *viridis* types subnormal ones. The *xanthas* occupy an intermediate position. It is concluded that many chlorophyll mutations in barley owe their origin rather to changes in the development of the initial plastid structures themselves than to the inhibition of chlorophyll and carotin formation exclusively. Cells entirely lacking in plastids appear not to exist in the higher plants except in combination with cells or tissues containing full-grown plastids or their predecessors.

Two recessive progenies of a *tigrina*-like mutation were examined, one almost green, one extremely *tigrina*-like. The former showed subnormal plastids in the green parts, the latter type small, somewhat abnormal plastids.

178. Livingston, J. E. 633.16–2.451.2–1.521.6:575.11
The inheritance of resistance to *Ustilago nuda*.
Phytopathology 1942 : **32** : 451–66.

Two varieties of barley susceptible to *Ustilago nuda* (Missouri Early Beardless and Colsess IV) were used in this study in which the resistant varieties Trebi and *Hordeum deficiens* were used as parents. Infection reactions of F_1 from reciprocal crosses of Trebi with Colsess IV showed that infection takes place regardless of the resistance or susceptibility of the female parent. There is evidence that the resistance factors carried by the two resistant parents are similar in their effects; that there is a weak resistance factor in Missouri Early Beardless; and that there is no linkage between the factors for resistance and those for hoods or six-rowness.

Promising selections of hooded, six-row, winter barleys resistant to *U. nuda* were obtained.

MILLETS AND SORGHUM 633.17

179. Ciferri, R. 633.174–1.524(63)
La cerealicoltura in A.O.I. IX—Le durre. **(Cereal cultivation in Italian East Africa. IX—Sorghums).**
Ital. Agric. 1942 : **79** : 294–304.

Notes are given on the forms, which are very varied and mixed by crossing, and their distribution.

180. Melchers, L. E. 633.174–2.411.4–1.521.6:575.12
On the cause of the milo disease.
Phytopathology 1942 : **32** : 640–41.

The causal factors responsible for the typical symptoms shown by seedling and mature susceptible milo plants and milo hybrids in the greenhouse and in the field cannot be attributed to *Pythium arrhenomanes* alone. Details of the investigation are to be published in another paper.

181. Quinby, J. R. and Gaines, J. C. 633.174–2.7:575.12
The effect of parasites and predators on corn earworms in Sumac Sorgo heads.
J. Econ. Ent. 1942 : **35** : p. 264.

"As part of the breeding work at Substation No. 12, Chillicothe, Texas, sorghum heads are bagged to obtain selfed seed. The procedure is to bag the heads after they begin to emerge from the boot, but before blooming begins at the tip of the head. A sorghum head will ordinarily bloom completely in about a week and after blooming is complete the bags are broken to check the growth of fungi and allow injurious insects to be exposed to their natural enemies.

In the case herein reported, the Sumac Sorgo heads were allowed to remain in the bags two weeks after complete blooming. One hundred and ninety-three heads were bagged for selfed seed and weights were carefully made of the yield of seed from each bag and, wherever a bagged head appeared, an unbagged head was weighed from the adjoining row.

It seems impossible to get the bags on before corn earworm moths oviposit, and it is not unusual to find as many as 6 worms on one head. One worm is capable of causing considerable injury to a head as they feed on the seed when it first develops.

The average seed yield of 193 unbagged heads was ·074 pounds per head as compared to ·02 pounds per head for the bagged heads. The corn earworms destroyed about 75% of the grain

on the bagged heads. The protection of the worms from their natural enemies allowed them to cause severe injury. Apparently parasites and predators are very important in keeping the corn earworm injury down in sorghum heads".—Authors' summary.

RICE 633.18

182. *Meulen, J. G. J. van der 633.18:575(92)
De rijstselectie in Nederlandsch Indië. (**Rice selection in the Netherlands East Indies**).
Landbouw 1941 : **17** : 943–1030.

This monograph deals with selection and breeding of *O. communis* Kcke in the N.E.I. Van der Stok's classification of the species into *boeloe* and *tjereh* was confirmed by the author's study (cf. "Plant Breeding Abstracts", Vol. X, Abst. 453). These two types of varieties may be broadly distinguished as bearded and beardless respectively, though other distinctive features also exist in the two groups. The chromosome number of some *boeloe* and *tjereh* varieties of the *communis* group was determined by Heyn (cf. "Plant Breeding Abstracts", Vol. VII, Abst. 923).

The following are among the features considered in rice selection and breeding: yield, tillering, quality, drought resistance and ability to grow in and with rapidly rising water, susceptibility to fracture, appearance and the physical features of the grain (including dimensions and texture, transparency, the presence of an internal or laterally situated white spot, milkiness, etc.). Spotting is an undesirable and heritable character though its occurrence may be influenced to some extent by external factors. "Milkiness" is also a varietal character, although a similar phenomenon termed "dead white" is entirely due to environmental conditions.

The *tjereh* varieties appear to lodge more readily than the *boeloe* varieties, though there are considerable differences also within the 2 groups: e.g. among the *boeloes* Bali Kambang 37 is very resistant to lodging, while Brondol poetih 277 lodges much more easily.

Vegetative period and development have also been studied in both groups. Though a positive correlation appears to exist between the long growth period and high yield, this is of little value for practical breeding since the correlation is far from absolute and also there are many early maturing varieties (at least among the *tjerehs*) whose yield is not inferior to that of late forms.

The early maturing rices needed in the N.E.I. must be obtained by hybrid selection.

The problems which "mentek" disease presents to the breeder are discussed. Though it does not appear to be confined to any particular group or groups of varieties, most of the resistant types are found among the unawned (*tjereh*) types.

Shedding is mainly found in *tjereh* rices: when it does occur in the *boeloes*, it is regarded as a great defect, whereas in the former it may or may not be so, depending on the native requirements or the economic background. The method of determining shedding in selection work is touched upon.

After a study of natural crossing the author was led to believe that the *tjereh* types cross very little *inter se* (less than 1%), while the *boeloe* varieties show a percentage of 1–3 for inter-varietal hybridization. The highest percentages of crossing (even up to 14%) may occur in *boeloe* types when they are planted next to *tjereh* varieties—the latter remaining however unaffected by this juxtaposition.

The main methods of rice improvement: variety selection involving also mass selection, line selection and hybrid selection are described, with instances of results obtained by their use in the N.E.I. In the author's view these still provide such wide opportunities for the breeder that recourse to artificial induction of mutations need not be considered for the present.

Wide opportunities for observation have led him to conclude that mutation in rice is very rare: one case was observed by him in 14 years.

The zonal adaptation of any new, high-yielding, high quality and lodging resistant varieties produced is also of importance in the N.E.I.

In the work at Buitenzorg and other experimental plantations 26 hybrid selections have been isolated from the following crosses (representing crosses of *tjereh* x *boeloe*, *boeloe* x *boeloe* and *tjereh* x *tjereh* types): fourteen from Skrivimankoti x Baok, one from Oerang oerangan x Tjina, three from Rogol x Baok, two from a mixture of 7 hybrid populations from natural

* An extended summary of this paper is on file at the Bureau.

crossing, one from Chingfow x Karang serang and five from Lati sail bengal x Tjina. In the 1940-41 west monsoon 40 selections of Lati sail bengal x Tjina were tested at various substations and it is hoped that from them varieties rivalling Oentoeng and Tjina may be obtained. Many of these selections have the typical long, narrow translucent kernel (i.e. the Siam or Tjina type) and may be suitable for export.

Further progress in improving the yield and quality of the bearded varieties may be expected when the new hybrids from crosses of the above varieties *inter se* and with other varieties become available. The quality too of these bearded selections is being kept in mind with a view to possible future exports of surplus to Europe and other countries.

Java varieties have proved unsuitable to conditions in Borneo, so selection is to be carried out in the latter island with the varieties found there and others from Sumatra and elsewhere. Many Sumatra rices are already being investigated for purity, quality and seasonal flowering at Buitenzorg and can undergo line selection later. In addition some unawned hybrid strains selected in Java and retained, because of their lateness in ripening, only for certain regions of the "outlying islands", will be tested in Sumatra and local hybrid selection will be carried out. Already some special crosses have been made and F_2 seed is available.

In South and West Borneo local line selection of the native varieties Bajar poetih and Bajar koening is contemplated and there are at Buitenzorg in addition facilities for testing deep water rices and crosses are to be made between rices from the Kaloedan and Negara morass regions; and some floating varieties are to be crossed with deep water types and the F_4 and F_5 populations investigated in Buitenzorg and in morass regions of the South and East.

Rice production in Celebes having increased to such an extent that a surplus for export is available, quality is now receiving special attention in hybrid selection.

Statistical and other tabular data relating to rice breeding research, illustrations and a bibliography conclude the paper.

183. 633.18:575:631.8(92)

Both, M. P. 633.18.0014(92)

Rijstselectie en bodemvruchtbaarheid. (**Rice selection and soil fertility**).

Landbouw **1941** : **17** : 735–47.

Since rice varieties may react very differently to differences in soil and climate, variety trials should be conducted in conjunction with manuring experiments, thus ensuring that new varieties will be created that with more intensive cultivation will give the best results.

Variety selection combined with studies of those soil types in which the varieties did best showed that the number of all-round types was very small, Oentoeng being the only one with a high performance in 3 types of soils; and only 3 other varieties did best in more than one type of soil.

In further experiments Skrivimankoti, No. 79 Srajoe and No. 75 Ramcajara, surpassed the standard Gilri in yield on non-irrigated manured soil dependent for moisture on rainfall. It appeared too that on irrigated and manured soil the group of varieties that yielded best was also outstanding on irrigated and unmanured soil. Only one variety 1E/236 showed a greater water requirement than the others giving its highest yield with irrigation. Skrivimankoti surpassed the standard under all conditions.

Other experiments showed considerable annual differences in the reaction to soil improvement measures.

Later investigations indicated that the length of the growth period was shortened by manuring and irrigation in some varieties, but in others remained unchanged. With green manuring, varieties resistant to lodging are required.

Rice selection on these lines is all important for the "outlying possessions" in the N.E.I. and local selection plantations are to be established in some important rice districts: they are to be regarded not solely as representing soil types but more generally as regional selection plantations so that local requirements may be taken into account. This research will become even more valuable and economically worth while, once the land races and native methods of cultivation have been improved.

184. Brown, W. V. 633.18:576.312.35

Cytological studies in the Oryzeae and Zizaneae.

J. Elisha Mitchell Sci. Soc. **1941** : **57** : 201–02. (Abst.).

"The 4 genera, *Leersia* and *Oryza* of the Oryzeae, and *Zizania* and *Zizaniopsis* of the Zizaneae

were studied for chromosome size and numbers. The basic number for the Oryzeae as determined from 3 species of *Leersia* and 2 species of *Oryza* is 12. The basic number in the Zizaneae is perhaps 6, *Zizania aquatica* having $2n = 30$, while *Zizaniopsis miliacea* has $2n = 24$".

185. KUILMAN, L. W. 633.18–2.19–1.521.6:581.43
Wortelstudies aan tropische landbouwgewassen. 1. Wortelontwikkeling en vruchtbaarheid. (Root studies of tropical agricultural crops. I. Root development and fertility).
Landbouw 1941 : **17** : 673–90.

"Mentek", a disease in all probability due to potassium deficiency, is less widespread than formerly in the N.E.I., possibly owing to successful selection for resistant varieties of rice conducted by the Institute of Agronomy (Cultuurtechnische Instituut) and also the elimination by the native population of the most susceptible varieties to avoid losses of their crops.
Two instances are cited in which the very susceptible variety Temas when grown in plantings of 15 plants per hole, instead of singly was quite resistant to the disease.
On the basis of further observations this resistance is attributed to well developed dense root system with numerous very fine root fibres. Among the varieties with this type of root system are the old, long established varieties Poeloet, Nangka, Gading Kloeang and Moering, which in a test carried out in collaboration with the plant breeders of the Institute show little or no signs of potassium deficiency, though grown on soil known to lack potassium. The varieties with a coarse root system on the other hand showed deficiency symptoms. Further investigations showed a marked correlation between mentek resistance and the number of fibrous rootlets and it is probable that resistant forms are able to utilize the soil minerals more intensively. Moreover a survey of varieties graded according to their type of root system shows that among the resistant forms there are many that are widely grown for their high yield, e.g. Oentoeng, Brondolpeotih T.43, Lati Sail, Tjina.
A good standard method of evaluating the fineness of the root system still needs to be worked out in order that the personal element in the judgment may be eliminated.

186. RYKER, T. C. and
CHILTON, S. J. P. 633.18–2.484:576.16:631.521.6:575.116.1
Inheritance and linkage of factors for resistance to two physiologic races of *Cercospora oryzae* in rice.
J. Amer. Soc. Agron. 1942 : **34** : 836–40.

The linkage between resistance and susceptibility of the rice Blue Rose to two races of *Cercospora oryzae* was examined (see "Plant Breeding Abstracts", Vol. XI, Abst. 721). E. K. J.

FORAGE GRASSES 633.2

187. 633.2:575
U.S.A.: Symposium on grass breeding.
Chronica Botanica 1942 : **7** : p. 181.

The symposium was held at the November, 1941, Meetings of the American Society of Agronomy. The following subjects were among those discussed; the use of ecotypes in grass breeding with special reference to grazing practices; breeding grasses for disease resistance, while giving consideration to the interaction of host and pathogen under different systems of management and different environments; the role of hybrid vigour and of polyploidy in grass breeding (no evidence has so far been obtained that great progress can be made by induced polyploidy in the breeding of forage plants); and the problem of apomixis and the isolation or maintenance of varietal purity. In this connexion it is noted that many of the variations fixed by apomixis differ strikingly and favourably from types produced sexually.

188. 633.2:575.11
633.2:576.312
633.3:575.11
633.3:576.312
5th Annual Report of the U.S. Regional Pasture Research Laboratory, State College, Pa., 1941 : Pp. 120.

Inter alia genetical and cytological work on cocksfoot, perennial ryegrass, timothy, smooth stalked meadow grass (Kentucky bluegrass), meadow fescue and white, strawberry, red,

alsike and sweet clover is reported. Publications dealing with the work of this laboratory have been reviewed in "Plant Breeding Abstracts", Vol. XII, Absts 172, 474, 800, 801 and 806.

189. Brown, W. L. 633.21:576.356.5:581.163
The cytogenetics of *Poa pratensis*.
Ann. Mo. Bot. Gdn 1941 : **28** : 493–515.

Attempts are made to correlate data from morphological, cytological and genetic studies of progenies of different strains ($2n = 42$–56) of *Poa pratensis* grown in America. Evidence is presented to show that apomixis is prevalent generally in the high polyploid forms and "maternal like" progeny was produced by open pollination as a result of stimulation by foreign pollen.

Bagging resulted in the production of highly variable progenies, apparently the products of gametic union.

This simultaneous operation of apomixis and sexual reproduction within single strains is partly responsible for the extreme diversity of the species.

Chromosome complements composed of odd numbers may segregate to even numbered types which are morphologically different. The addition of one whole set of 7 chromosomes was found necessary to change a thin leafed tall form to a broad leafed short type.

It is suggested that *Poa pratensis* may have originated as an allopolyploid, partially apomictic, hybrid. E. K. J.

190. Nilsson-Leissner, G. 633.24:575.14
On the possibilities of breeding new, improved strains of timothy by means of selfing.
Hereditas, Lund 1942 : **28** : 500–02. (Abst.)

Nine self-fertile timothy plants were selected from extensive material collected in Scandinavia and Germany. The best plants were selected in each generation and compared with clones of the mother plants. Although a successive decrease in yield was noted for each inbred generation, there was a detectable effect of selection on the yield, and certain I_4 families gave an average yield which was greater than that of the parents.

Selection for earliness was very effective, certain selections were highly resistant to rust, and re-growth was not adversely affected by selection. It is therefore concluded that inbreeding affords a promising method of breeding for timothy.

191. 633.262:581.162
Harlan, J. R. 633.262:575.11:582
The breeding structure of *Bromus carinatus*, Hook. & Arn.
Amer. J. Bot. Suppl. 1941 : **28** : p. 3s. (Abst.).

"All members of the *Bromus carinatus* complex examined have the habit of facultative cleistogamy, such that each individual plant usually produces some cleistogamous panicles and some open-flowered panicles. Numerous populations derived from individual wild plants were examined. Populations from different sources may be markedly different, but plants within the same population are usually highly uniform. Occasional, strikingly different types were found, indicating some interracial crossing. The breeding structure, as determined by population analyses, is discussed with special reference to the mathematical models of Sewall Wright and to the taxonomic difficulties in the group".—Author's summary.

192. Garber, R. J. and
Chilton, S. J. P. 633.282–2.8–1.521.6:575.11
The occurrence and inheritance of certain leaf "spots" in sudan grass.
J. Amer. Soc. Agron. 1942 : **34** : 597–606.

The F_2 and F_3 data from crosses involving three types of leaf spotting (cause unknown) and observations made among selfed lines of *Sorghum vulgare* var. *sudanense* (Piper) Hitchc. indicate that the leaf spots are conditioned by inheritance, but that the inheritance—disregarding colour (see "Plant Breeding Abstracts", Vol. IX, Abst. 748)—is not simple.

193. STEBBINS, G. L. (jun.) 633.285:576.356.5:581.143
Comparative growth rates of diploid and autotetraploid *Stipa lepida*.
Amer. J. Bot. Suppl. 1941 : **28** : p. 6s. (Abst.).
Progenies of plants raised from colchicine treated seed were grown in cultures. Two progenies, derived from completely tetraploid parents, were entirely $4n$; one was predominantly $4n$; one entirely $2n$; one predominantly $2n$; and two contained $2n$ and $4n$ plants in comparable numbers. In the latter, the number and length of the primary roots, the number of tillers and leaves, and the mean length of the three longest leaves were all significantly less at $2\frac{1}{2}$ months in their $4n$ than in their $2n$ members. In one of these two progenies mean leaf breadth was the same in $2n$ and $4n$; in the other the mean width was significantly less in the $4n$. The $4n$ or predominantly $4n$ progenies showed similar retardation of growth as compared with the $2n$, and $4n$ plants as a whole flowered later than $2n$. Individual $4n$ plants exceeded the means of the $2n$ in all growth characteristics, while the means for one $4n$ culture equalled in top growth those of the best $2n$ culture. The $4n$ plants varied in fertility from 0 to 73% seed setting, but this variation was not definitely correlated with growth vigour or earliness.

194. FULTS, J. L. 633.287:576.312.32
Somatic chromosome complements in Bouteloua.
Amer. J. Bot. 1942 : **29** : 45–55.
The study was made in 18 biotypes belonging to 7 species and involved 114 plants from 85 seed sources. Chromosome numbers varied from $2n = 21$ to $2n = 98$.
No definite relation between chromosome complements and biotypes was found in *B. gracilis* or *B. curtipendula*.
The common occurrence of prochromosomes in resting cells of both meristematic and differentiated tissues in the above two species should prove of value to the plant breeder if it can be confirmed that their number is the same as the number of chromosomes.

195. MURPHY, R. P. 633.289:575
Methods of breeding crested wheatgrass, *Agropyron cristatum* (L.) Beauv.
J. Amer. Soc. Agron. 1942 : **34** : 553–65.
Plants selected from the forage and Fairway types formed the material of the work, the primary objectives of which were (1) to study variability among plants tested in individual plant nurseries and in replicated clonal progenies; and (2) to determine the effects of self fertilization in relation to various characters. The characters studied included yield, plant height, damage from root rot, fertility, chromosome number, pollen size and fertility, and content of beta carotin pigment. The plants from the forage type had a normal somatic chromosome number of 28 and those from the Fairway type 14. In the forage type only one plant, 58–37, out of 33 had a definite aneuploid chromosome number. Fifteen one-year selfed plants from three different progenies of the forage type all had a $2n$ chromosome number of 28. It is concluded that further improvement over individual plant selection can be made by selection among superior plants after they have been tested in replicated clonal progenies. Selection within selfed progenies is not considered a promising means of improvement, but if the process is used, a greater search for lines or strains which set seed under conditions of self-fertilization is necessary.

196. ROBERTSON, J. H. and WEAVER, L. 633.289:576.356.5
A new tetraploid wheatgrass from Nevada.
Bull. Torrey Bot. Cl. 1942 : **69** : 434–37.
"In considering the lack of definite evidence for hybridization as compared with the occurrence of distinctly tetraploid morphological characters and the double number of chromosomes, it seems most likely that this giant wheatgrass is a tetraploid form of *A. spicatum*".

197. MCCLURE, F. A. 633.289:582
New bamboos from Venezuela and Colombia.
J. Wash. Acad. Sci. 1942 : **32** : 167–83.
Descriptions are given, in English and Latin, of certain species of *Anthrostylidium*, *Elytrostachys*, *Chusquea* and *Neurolepis*.

LEGUMINOUS FORAGE PLANTS 633.3*

198. Milovidov, P. F. 633.3:576.356.5
Über die Chromosomenzahlen bei einigen Leguminosen und anderen Pflanzen. (**The chromosome numbers in certain leguminous and other plants**).
Planta 1941/42 : **32** : 38–42.

The following diploid chromosome numbers are reported: *Melilotus officinalis* (L.) Med. = 16, *Ornithopus sativus* L. and *O. perpusillus* L. = 14, *Lotus corniculatus* L. and *L. uliginosus* Schkuhr. = 24 and *Casuarina torulosa* Ait. = 18.

199. Atwood, S. S. 633.322:581.162.5:575.113.3
Oppositional alleles causing cross-incompatibility in *Trifolium repens*.
Genetics 1942 : **27** : 333–38.

An abstract of this paper has been previously printed (see "Plant Breeding Abstracts", Vol. XII, Abst. 806). H. W. H.

200. Atwood, S. S. 633.322:581.162.52:575.11
Genetics of pseudo-self-compatibility and its relation to cross-incompatibility in *Trifolium repens*.
J. Agric. Res. 1942 : **64** : 699–709.

Pseudo-self-compatible plants of *T. repens* are defined as those which set a considerable number of selfed seeds when entire heads are manipulated by hand, but which fail to do so when not manipulated or when 10 flowers per head are artificially pollinated. This condition appears to be inherited as a quantitative character, probably determined by several additive genes.
True cross-incompatibility was studied in a cross segregating also for pseudo-self-compatibility. Four intra-sterile, interfertile groups were found among F_1 plants and inheritance was shown to follow the usual diploid, personate scheme with the parents differing in all four of the *S* genes which they carried (see also "Plant Breeding Abstracts", Vol. XII, Abst. 1094).
When F_1, F_2 and homozygous plants were back-crossed to the original female parent, some unexpected results were obtained; these were explained by the assumption that the parent had, either by mutation or contamination, changed from S_4S_5 to S_4S_4 subsequent to the original cross.
Little or no relationship was found between the *S* genes and pseudo-self-compatibility. The latter character, it is pointed out, may be very useful in a breeding programme, since it would be possible to produce selfed lines which would out cross when subjected to open pollination. S. E.

201. Svešnikova, I. N. 633.35:576.312.34:576.16:578.08
A new technique for the comparative cytological analysis of species.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **30** : 756–58.

The author compares the chromomere structure of the somatic chromosomes of related species of *Vicia* (*V. sativa*, *V. amphicarpa*, *V. angustifolia dolichosomica*, *V. angustifolia brachisomica*) and attempts by a phylogenetic study of the differences found to interpret the structural changes that have taken place in the chromosomes. So long, of course, as the relations between the structures observed by the author (by means of the platinum-chloride-formalin fixing method) and the spiral structure of the chromosomes and hetero- and euchromatin are not cleared up, the assumption that they are true chromomeres and the conclusions based thereon must be debatable. In the reviewer's opinion, comparison of the salivary glands of *Drosophila* with the metaphase chromosomes of plant root-tips, is, in face of the completely different structure of these chromosomes, inadmissible. R. M. I.

202. Albrecht, H. R. 633.35:581.162:575"793"
Earliness of maturity as a factor influencing seed production in vetch.
J. Amer. Soc. Agron. 1942 : **34** : 662–67.

The LaFayette and Monala varieties of *Vicia monantha* are sufficiently hardy for use in Alabama. They are susceptible to root rot, however, and therefore should not be planted on

* See also Abst. 188.

poorly drained soils. These varieties are heavy seed producers and have vigorous early spring growth. A few early maturing strains of *V. dasycarpa* are also satisfactory seed producers, but they shatter as the pods mature.

203. Smirnova, M. I. and
Moškov, B. S. 633.367:575.257:581.6
Changes of the alkaloid content in lupin grafts.
Soviet Plant Industry Record 1940 : No. 2 : 68–77.

The authors report on extensive researches on the influencing of the alkaloid content of lupins by means of grafting. As before, reciprocal grafts were made using specimens of bitter and sweet lupins, partly in the seedling stages and partly as grown plants. The changes in the alkaloid content in the scion were determined as against whole plants of the corresponding form and against control grafts. Again, an effect of the stock on the alkaloid content of the scion was observed. This is especially marked in the grafts of sweet on bitter; here the scion takes on to a marked degree the character of the bitter lupin, in grafts with older plants including the seeds, an alkaloid content increase up to 16 times may be shown. In the reverse graft the influence is less, although there was a definite lowering of the alkaloid content of the "bitter" scion on the "sweet" stock. Also in grafts of peas on bitter lupins a considerable alkaloid content was found in the scion. R. M. I.

204. Zimmermann, K. 633.367:581.47:581.148:575
Histologische und entwicklungsgeschichtliche Untersuchungen an Hülsen von *Lupinus luteus*, insbesondere der Neuzüchtung 3535A mit nichtplatzenden Hülsen. (**Studies of the histology and development of the pods of *L. luteus*, in particular the new hybrid 3535A with non-splitting pods**).
Züchter 1942 : **14** : 129–32.

The sclerenchyma strand in the vascular bundles of the two sutures is uninterrupted in form 2535A, as opposed to the normal splitting forms in which it is broken in the middle of the suture. The histology of these sutures in the course of their development is described and illustrated both from 3535A and for the normal form. Sections of a young pod can be examined microscopically during breeding operations and will immediately show whether a hybrid belongs to the shedding type or not.

305. Meyer, K. 633.367:581.6:578.08
Photometrische Alkaloidbestimmung zur Untersuchung von Zuchtmaterial der weissen und blauen Lupine. (**Photometric determination of alkaloid content for investigating breeding material of white and blue lupin**).
Landw. Jb. 1941 : **91** : 418–40.

A colorimetric method of estimating alkaloid content by the use of molybdenum blue, and suitable for use on small portions of a seed down to 0·1 grm. in weight, is described. In yellow and blue lupins the values for alkaloid content of leaves agree with those for the grain, and the two are combined in making selections; in the white lupin the two values sometimes differ. The youngest leaves have a higher alkaloid content than the older leaves; very little variation in alkaloid content was observed between plants with low and high yield, but the difference between the alkaloid content of grains from the same plant was often considerable, both in bitter and sweet forms.

206. 633.372:576.312.35
Castro, D. de 633.372:576.356.5
Algumas contagens de cromosomas no género *Ulex* L. (sensu lato). [**Some chromosome counts in the genus *Ulex* L. (*sensu lato*)**].
Agron. Lusitana 1941 : **3** : 103–13.

The genus *Ulex* has certain practical possibilities in Portugal either as pasture or as green manure. Both mitotic and meiotic counts were made of the chromosomes in a number of species. Taking 8 as the value of x, forms with $4x$, $6x$, $8x$, $12x$ and $16x$ have been found. *Ulex* is thus one of the few highly polyploid genera of the *Leguminoseae*.

207. Crescini, F. 633.42:575.129:635.15
Il "Rafanobrassica" (*Raphanus sat.* x *Brassica oler.*). [**Raphanobrassica (*R. sativus* x *B. oleracea*)**].
Ital. Agric. 1942 : **79** : 253–58.
A brief account is given of Karpechenko's *Raphanobrassica* and its properties. Cultivation tests with *Raphanobrassica* showed it to be biennial. The yield of seed was less than that of colza and rape and the oil content of the seed less; it was found to be also inferior to these 2 species in fodder value.

208. Kopetz, L. M. 633.425:581.143.26
Zeitstufenversuche mit der Kohlrabisorte "Roggli". Ein Beitrag zur Frage der Auslösung von Schossern. (**Periodic sowing tests with the kohl-rabi variety Roggli. A contribution to the question of producing bolters**).
Züchter 1942 : **14** : 136–37.
The Roggli variety is less prone to bolt than other varieties even after quite keen spring frosts. Periodic sowings were made from 1st August onwards, all seedlings being then subjected to the same cold treatment and planted out at the same time in the spring. The earliest sowings all bolted and the percentage of bolting gradually diminished in the later sowings. The age of the plant at the time of incidence of the low temperature was thus the deciding factor in determining the degree of bolting.
Similar results were obtained with onions.

209. Sixta, J. 633.491:575(43.7)
Odrůdy bramborů keřkovského šlechtění. (**Potato varieties bred at Keřkov**).
Česk Zeměd., Prag, 1941 : **23** : 1–3. [From Forschungsdienst 1942 : **13** : p. *54*].
Descriptions are given of Bohemian and other strains of potatoes being bred at Keřkov.

210. Meunissier, A. 633.491:575(44)
Les problèmes de sélection chez la pomme de terre. (**The problems of selection in the potato**).
Rev. Hort. Paris 1940 : **27** : 177–80; 1941 : **27** : 202–03.
The author discusses the importance of selecting virus-free stocks, for which purpose a special research station has been established at Bréhoulon (Finisterre). Reference is then made to the possibility of producing varieties resistant to blight, to wart and to Colorado beetle. It is pointed out that the French domestic varieties are much more varied than the English and much can still be achieved by intercrossing them; varieties suitable for transmitting certain characters are mentioned. The necessity of broadening the basis of selection by crossing with primitive species is however becoming increasingly evident; promising hybrids resistant to blight, frost and Colorado beetle have already been obtained in crosses with *S. demissum*, and the qualities of several of the S. American species are enumerated.

211. Kasparova, S. A. and
Glazunov, I. V. 633.491:581.192(98)
Variation of biochemical processes in resting potato tubers grown in the Arctic.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 679–82.
Discusses the effect of prolonged storage at 2° C. upon potatoes grown in the arctic circle in relation to their chemical constitution and enzyme activity. C. M. D.

212. Ellis, N. K. 633.491:581.44
A comparison of stands and yields from seed pieces cut from the apical and stem ends of Irish Cobbler, Russet Rural, and Chippewa potatoes.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 516–18.
It is suggested that there may be a difference between varieties in their reaction to apical dominance of the seed pieces.

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* See also Absts 79 and 82.

213. 633.491:581.48
WOLLENWEBER, H. W. 633.491:581.162
Über die Lebensdauer von Kartoffelsamen. (**The duration of viability in potato seeds**).
Angew. Bot. 1942 : **24** : 259–60.

Seeds were harvested from spontaneous berries of the variety Deodara in 1922 and kept in glass bottles at room temperature. In March 1935 the seeds tested were all viable; 5 years later 26% germinated and 2 years later still (i.e. after 20 years) 17%. The variety Thieles Früheste gave 9% germination in the 20th year.

214. SNELL, K. 633.491:582(43)
Die Lichtkeime der im Jahre 1942 zugelassenen Kartoffelsorten. (**The daylight sprouts of the potato varieties certified in 1942**).
Angew. Bot. 1942 : **24** : 249–58.

The varieties referred to in the author's book on the subject (cf. "Plant Breeding Abstracts", Vol. III, p. 223) have been largely replaced by new ones and descriptions are here given of the tubers and sprouts produced in daylight for some 70 new varieties.

215. MEYER, G. 633.491–2.411.4–1.521.6
Zellphysiologische und anatomische Untersuchungen über die Reaktion der Kartoffelknolle auf den Angriff der *Phytophthora infestans* bei Sorten verschiedener Resistenz. (**Physiological and anatomical investigations on the reaction of the potato tuber to attack by *P. infestans* in varieties differing in resistance**).
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1940 : **23** : 97–132.

A full description is given of the development of the mycelium of *P. infestans* strains of group A on cut tubers of blight susceptible cultivated varieties and of the W races, and of the resulting changes occurring in the tuber. The W races, which are all resistant in the leaf, differed in tuber resistance. The resistant were the first to show a reaction to the parasite and their reactions proceeded at a much more rapid pace all through; in other respects the reactions were similar to those of the susceptible varieties, except that no wound periderm separating the necrotic tissue from the surrounding tissue was observed in the resistant varieties. No fructifications of the fungus were observed in the resistant forms, and tannin detecting reagents gave a positive reaction at an earlier stage than in the susceptible tubers.

216. FEDOROVA, N. J. 633.491–2.411.4–1.521.6:575.127.2:578.08
Isolierung von Phytophthoraresistenten Formen der Kartoffel durch Beurteilung der Nachkommenschaft. (**Isolation of *Phytophthora* resistant forms of the potato by judging the progeny**).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 282–84.

In 1937 all samples of *Solanum demissum* and *S. Antipoviczi* available at the Institute for Potato Cultivation in Moscow were crossed with *S. tuberosum* (variety, Smyslovsky [Fürstenkrone]), the object being to test the forms of different lines of *S. demissum* and *S. Antipoviczi* that were heterozygous for *Phytophthora* resistance by comparing them with homozygous recessive forms.

In 1938, 647 F_1 plants were raised from the cross *S. demissum* x *S. Antipoviczi*. The F_1 families differed according to the form of *S. demissum* used. In all cases immunity to *Phytophthora* was dominant to susceptibility, as Müller had already found. Some of the F_1 families contained 50–100% of susceptible plants among their progeny, whilst other families showed exceptional resistance, e.g. F_1 *S. demissum* 037 x *S. tuberosum*.

Among the offspring of *S. dem. tlaxpehualcoense* 026/C–14 and *S. dem. atracyancum* 0225 022 with Smyslovsky there were 60–100% of susceptible plants. *S. dem. xitlense* with badly infected tubers and resistant foliage gave a progeny with resistant foliage. Out of 150 F_1 *S. dem. xitlense* x Smyslovsky hybrids only 4% were resistant. The F_1 hybrids of *S. demissum* x *S. tuberosum* proved less resistant in their tubers than in their foliage.

Estimation of resistance from the tubers was found to be much more reliable than from the foliage.

The F_1 hybrids differed markedly in tuber production. *S. demissum* 037 x *S. tuberosum* formed no tubers in the case of 57·5% of the plants, while the remaining plants formed from

1–4 tubers on one plant. In the F_1 families from *S. dem. xitlense* 063 x *S. tuberosum* 15·3% formed no tubers and the rest 2–65 tubers (30–550 grm.) on one plant. Good tuber formation was obtained in F_1 *S. demissum vilmorin* x *S. tuberosum.*

Evidently the F_1 hybrids (*demissum* x *tuberosum*) segregate markedly for *Phytophthora* resistance and other characters, the type of segregation being determined by the character of the parent form of *S. demissum* used in the cross. Also, offspring 100% susceptible are obtained from crosses of the susceptible form of *demissum* with the susceptible cultivated varieties; and conversely the resistance of the F_1 offspring increases as more resistant parent forms are used.

Pushkarev's results (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1235), which were in direct contrast to the above, are criticized.

217. Müller, K. O. and Griesinger, R. 633.491–2.411.4–1.521.6:581.036:575

Der Einfluss der Temperatur auf die Reaktion von anfälligen und resistenten Kartoffelsorten gegenüber *P. infestans.* (**The influence of temperature on the reaction of susceptible and resistant varieties of potatoes to *P. infestans*).**

Angew. Bot. 1942 : **24** : 130–49.

In the series of experiments with a number of resistant and susceptible varieties of potatoes here described further support was found for Müller's theory that the "resistance genes" do not produce an all-or-none reaction, but operate as accelerators of the defence reaction of which both susceptible and resistant genotypes are capable. The difference between plants bearing such genes for resistance (as demonstrated by hybridization experiments) and susceptible types is therefore only one of degree. In the present experiments one problem was to ascertain whether growth rate of the fungus and the readiness of the tuber cells to react were similarly affected by various temperatures or whether mutual stimulation or inhibition could be observed.

Should it prove possible by means of temperature to modify susceptibility to such an extent that the reaction of the susceptible individual closely approached that of the resistant plant, this would fit in with the hypothesis that the rapidity with which the defence reaction takes place decides whether fungus or host will succumb. The problem as to how far the "reaction potential" of the different genotypes also plays a part will be considered in a subsequent paper.

The differences in resistance between the susceptible "Erdgold" and the two new W-varieties BRA5/31 and BRA9/31 (which are resistant in both their leaves and tubers) were most clearly evident between 19° and 21° C. Tuber tests of breeding material should therefore be made at such temperatures.

Between 5° and 11·5° C. the rate of the defence reaction in both the W-varieties increased as the temperature increased and a further slight increase in rate was observed between 21° and 25°.

Though a defence reaction also occurs in the variety Erdgold, it is too slow, as compared with the rate of development of the parasite, to be effective.

The optimum temperature range for resistance tests of tubers lies between 16·5° and 21° C.

218. Ext, W. and Goffart, H. 633.491–2.6–1.521.6(43)

10 Jahre Kampf gegen den Kartoffelnematoden in der Provinz Schleswig-Holstein. (**Ten years struggle against the potato nematode in the Province of Schleswig-Holstein).**

Angew. Bot. 1942 : **24** : 1–16.

The findings of Goffart on nematode resistance of potatoes (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1513) and the absence of immune varieties have been confirmed by subsequent investigations. Most varieties show considerable variation in the amount of attack and the extent of cyst infestation bears no direct relation to the plant growth. There are many early varieties which show considerable damage with slight infestation and several late varieties which, in spite of considerable infestation, exhibit only slight signs of damage. Even if varieties of the latter type (e.g. Ackersegen and Voran) give quite good yields in some cases, this may be attributed to the fact that in late varieties tuber growth does not begin until

after the nematodes have attained maturity. The yields of such nematode tolerant varieties however tend to decline rapidly and cultural measures must be used to defeat the pest.

219. SELLKE, K. 633.491–2.7–1.521.6:575.127.2
Ueber im Sommer 1938 im Kartoffelkäfer-Feldlaboratorium Ahun (Frankreich) durchgeführte Versuche zur Prüfung von Hybriden auf Kartoffelkäfer-Widerstandsfähigkeit. [**The experiments on testing hybrids for resistance to Colorado beetle carried out in the summer of 1938 in the field laboratory at Ahun (France)**].
Arb. biol. Reichsanst. Land- u. Forstw., Berl. 1940 : **23** : 1–20.

Some 1,520 clones arising from crosses of *Solanum tuberosum* with *S. demissum*, *S. acaule*. *S. chacoense* and *S. andigenum* were tested, together with a number of wild species. The resistance of the clones was tested by growing the young larvae on leaves in moist Petri dishes. Among the wild species *S. demissum* and *S. polyadenium* were classed as resistant. Marked differences in degree of resistance were noted between different races of *S. demissum*, race G62 being the most resistant of those tested, and G42 the least. On the most resistant forms the insects both ate less of the leaves and died sooner. *S. chacoense* was classed this year as partially resistant, together with *S. Commersonii*, *S. La Pampa* and *S. Caldasii*.
Five clones of the F_1 *S. demissum* Rio Frio x Beseler were classed as resistant. F_2 and F'_2 clones of *S. demissum* x Müllers Frühe were all either susceptible or partially resistant. Of the various *S. demissum* x *S. tuberosum* hybrids tested for the first time, 22% of the F_1 generation were resistant, whilst in the F'_2 and F'_3 generations only 3–4% were resistant. The resistance of the backcross seemed however to be not inferior to that of the F_2. No clear differences between the progenies of different varieties either of *S. demissum* or *S. tuberosum* were observed but different F_1 clones within the families showed very pronounced differences. The hybrids of species other than *S. demissum* were less resistant than the *demissum* hybrids.
A good general agreement was observed between the results of field and laboratory tests.

220. MILLER, J. C. and
COVINGTON, H. M. 633.492:577.16:575
Some of the factors affecting the carotene content of sweet potatoes.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 519–22.

The most feasible means of increasing carotin content is by hybridization.

221. KIMBROUGH, W. D. 633.492:581.6:575
Comparative yield and composition of the seedling L 4-5 and Triumph sweet potatoes.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : p. 444 (Abst.).

The L 4–5 consistently outyielded the Triumph variety and had a higher starch content in a 2 year test on time of planting and time of digging.

FIBRES 633.5*

222. ŠENDERETSKII, E. 633.5–1.524:551.566.3(47)
(**Extending new bast fibre crops into more northerly regions**).
Sotsialističeskoe Sel'skoe Khozjaistvo (Socialistic Agriculture) Moscow 1941 : Nos 7–8 : p. 92.

Research by the All-Union Institute of New Bast Fibre Crops on Gambo hemp, jute, ramie, Italian hemp, and Chinese jute has established that many regions of the Kossak Republic, the Volga Basin, Voronezh, Kursk and many other districts may become centres of raw materials for the hemp and jute industry.
Experiments have shown that Chinese jute can be grown for seed and fibre further north than was hitherto supposed, but as far north as the Smolensk, Gorky, Kirov, and Leningrad regions no seed is produced, though a good quality of fibre can be obtained.
Southern hemp too can be successfully grown for seed in more northerly latitudes.
Suitable methods of cultivation must of course be adopted to make such introductions a success.

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* See also Absts 79, 82, 84, 85, 257, 261.

223. Morgenroth, E. 633.51(81)
Die Kultur der Baumwolle in Brasilien. (**Cotton cultivation in Brazil**).
Forschungsdienst 1942 : **13** : 341–46.
In São Paulo 4 varieties are cultivated, all selections from the Upland varieties Texas Big Boll and Express. In the north east the perennial variety Moco, with lint length of 35–45 mm. is grown. Seed production is exclusively in the hands of the State.
The various cotton pests in Brazil are discussed.

224. Harland, S. C. 633.51:575.11:016
Abstracts of papers 1915–1941.
Soc. Nac. Agraria Inst. Cott. Genet., Peru 1942 : No. 1 : Pp. 32.
Abstracts in English are given of all the papers published by Dr Harland during the period 1915–41. Those published in the latter half of the period have already been reviewed in "Plant Breeding Abstracts".

225. Beasley, J. O. 633.51:575.127.2:576.354.4
Meiotic chromosome behaviour in species, species hybrids, haploids, and induced polyploids of Gossypium.
Genetics 1942 : **27** : 25–54.
Six types of Gossypium species are recognized on their geographical distribution, morphology and chromosome number and on chromosome pairing in interspecific crosses. These are Asiatic 13-chromosome species (chromosome constitution, 2A), African 13-chromosome (2B), Australian 13-chromosome (2C), American 13-chromosome (2D), Arabia-India 13-chromosome (2E) and American 26-chromosome species (chromosome constitution, 2 (AD)). The observations of several workers on meiotic chromosome behaviour in Gossypium species hybrids are summarized in a table.
No abnormalities of meiosis were noticed in the 13-chromosome species but the 26-chromosome species showed occasional univalents, quadrivalents and bridges.
An average of 10 quadrivalents per nucleus was observed in autotetraploid *G. herbaceum*. Autotetraploid *G. hirsutum* and *G. barbadense* plants averaged about 18 quadrivalents per nucleus.
Meiosis was studied in haploids of *G. hirsutum* and *barbadense*, an average of 1 bivalent per nucleus being observed.
Meiosis in the hybrid between the two closely related species, *G. arboreum* and *G. herbaceum* was regular but the occurrence of a bridge and fragment was common. Octoploids, chromosome constitution 2 $[(AD)_1\ (AD)_2]$, produced by doubling the chromosome number in F_1 hybrids of *G. hirsutum* x *G. barbadense*, had an average of 15·2 quadrivalents per nucleus.
Crosses between American 26-chromosome and Asiatic 13-chromosome species formed an average of 13 univalents, 10 bivalents and 1·5 quadrivalents per nucleus. Bridges were common at first anaphase. The hybrids, American 26-chromosome x American 13-chromosome, had a similar meiosis to the American 26 x Asiatic 13-chromosome hybrids. Hexaploids produced by doubling the chromosome number of both types of triploid were also studied.
The hybrid *G. arboreum* x *G. thurberi* showed an average of 4·7 bridges per cell at first anaphase. The amphidiploid from this cross and the hybrid between this amphidiploid and an American 26-chromosome species both formed mostly bivalents at first metaphase.
Similar meiotic studies to those reported above were also made in the following crosses: — American 26-chromosome x Australian 13-chromosome, x African 13-chromosome and x Arabia-India 13-chromosome; Asiatic 13-chromosome x Arabia-India 13-chromosome; and in African 13-chromosome x American 13-chromosome.
In the discussion the relationships between the types of Gossypium species and the changes in chromosome structure and speciation are considered. H. W. H.

226. Peebles, R. H. 633.51:575.42
Pure-seed production of Egyptian-type cotton.
Circ. U.S. Dep. Agric. 1942 : No. 646 : Pp. 20.
Following a discussion on stability of Egyptian-type varieties grown in the south-west States, the ill-effects of hybridization and procedure for maintaining pure seed are recorded.

227. O'Kelly, J. F. 633.51:575.7:575.12
Degeneration within cotton varieties.
J. Amer. Soc. Agron. 1942 : **34** : 782–96.
Standard varieties of cotton were tested to determine what changes occur within the variety when mixing with others is prevented. No evidence was obtained that a variety of recent hybrid origin will change more rapidly than others. E. K. J.

228. Campos Góes, O. 633.51:576.312.35
Cromosomios do algodoeiro "Quebradinho". (**Chromosomes of the "Quebradinho" cotton**).
An. 1ª Reun. Sul-Amer. Bot. Rio de J. 1938 : **3** : 326–29.
The somatic number 52 was established in the variety Quebradinho, extensively grown in the north east of Brazil, and it is therefore thought to be related to the American group *G. hirsutum* L., *G. purpurascens* Poir. and *G. barbadense* L. Descriptions and illustrations of the chromosomes are given.

229. Abaeva, S. S. 633.51:581.142:581.148(47)
Influence of high temperatures on viability of pollen in cotton (in relation to premature fruit dropping).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 443–45.
The effect of high air temperatures under normal conditions of growth upon pollen viability (which may lead to premature shedding of the fruit) was studied with an upland cotton No. 8517 and an Egyptian variety No. 35–1.
Both varieties gave similar results. From a total of 30 determinations it was found that pollen from flowers that had been kept at a temperature over 41–42° C. failed to germinate on the stigma of a normal but previously emasculated flower. The best germination was obtained with pollen kept at 35–37° C.
Owing to the time of incidence of high temperatures (over 40° C.) in cotton growing districts in Russia (11–12 o'clock noon) and to dehiscense of the anthers of most of the flowers by 8 a.m., pollination can proceed normally, except in regions where unfavourable weather conditions may occur with effects resulting in too high temperatures and dry atmosphere throughout the morning hours.

230. Novikov, V. A. 633.51:581.148:631.521.6:575
Causes underlying bud and boll shedding in cotton and means to control it.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 148–51.
The physiological aspect of the problem mainly is discussed, as well as the results of studies of conditions and factors favourable to shedding, including transpiration. Varieties of cotton characterized by intense transpiration are stated to be likely to be more resistant to high temperatures and therefore less prone to shedding. Egyptian varieties shed less than American ones. Measures that promote transpiration are recommended as a preventive of the defect.
In breeding for non-shedding varieties special attention should, it is suggested, be paid to forms in which transpiration, rate of photosynthesis and the formation of vitamins are high and the selected forms must be also characterized by high suction pressure of the buds and bolls and by a well developed root system such as is found in the Egyptian varieties.

231. 633.51–2.7–1.521.6:581.49(47)
(**Results of work of the Plant Protection Station of the Cotton Research Institute on pests and diseases of cotton and lucerne**).
Sojuznikhi, Tashkent 1941 : Pp. 72.
Tests of resistance to the attacks of red spider have shown Egyptian cottons and *G. herbaceum* to be the most resistant. The hybrid F_6 46, which is characterized by very hairy leaf surface, is particularly resistant and has been classed as practically immune. This hybrid will be used as a parent for further breeding. The Egyptian x Peruvian hybrid 40/5963 also proved very resistant.

232. Neely, J. W. 633.51.00.14:519.24:631.421
The effect of genetical factors, seasonal differences and soil variations upon certain characteristics of Upland cotton in the Yazoo-Mississippi Delta.
Tech. Bull. Miss. Agric. Exp. Sta. 1941 : No. 28.
Twenty-four strains of cotton which have been developed for commercial planting in the Mississippi Valley were planted in double restricted arrangements of eight replications for the four years 1935–38.
The results enabled the effect of genetical factors, seasonal conditions and soil variations and their interactions on 15 characteristics of upland cotton to be studied.
It was found that differences between strains in regard to each of the 15 characteristics were significant. Soil variations and seasonal conditions exerted a significant influence on each of the characteristics. The effect of seasonal influences predominated over the effect of genetical factors in regard to 12 of the characteristics. The interaction of strains and seasons and of seasons and soil variation were significant for most of the characteristics. O. K.

233. 633.52:575(47)
(Achievements and prospects of Soviet linen flax breeding).
Len i Konoplja (Flax and Hemp) 1940 : No. 10 : 22–26.
Soviet flax breeding has been based on the well known local strains, Pskov and others, all of which have been maintained in certain kolhozes as a source of breeding material. A number of the improved varieties produced by individual plant selection from these local strains are enumerated; these have exceeded the old varieties on an average by 10–30% in yield of fibre and by 2–5 numbers in quality. Their seed yield on the other hand has tended to be less. The newest varieties are resistant to rust but not to *Fusarium*, *Polyspora* or anthracnose.
In 1940 all the flax sown in the Soviet Union was of improved varieties. Studies have been made on floral biology, and natural cross-pollination. Intra-varietal crossing is now carried out without recourse to emasculation. It has been shown that the stigma is receptive 24 hours before the opening of the flower, while the stamens are still unripe; if pollination be effected in this stage emasculation is not necessary. Fertilization never occurred before 8 a.m. in the locality of Leningrad but by 10 a.m. nearly all flowers were fertilized.
Fibre yield is determined on samples weighing 40 grm. by the method of hot retting, and the results have been found to be very accurate.
Some of the hybrid strains under observation are resistant to *Fusarium*. Attempts are being made to obtain a many-stemmed fibre flax by means of Michurin's method of crossing geographically distant forms; some hybrids between N. Russian linen flaxes and many-stemmed forms from Azerbaijan bear 3–5 productive stems, the plants being very much taller than either of the parent forms. Thus the N. Russian linen forms were 90–95 cm. in height and the Azerbaijan forms 65–75, while the progeny contained forms 115–125 cm. in height and over, with a productive length of 95 cm.
Intra-varietal crossing has raised the yield of fibre by 13% in the variety Victor and the percentage of long fibre was raised from 13·1 to 15·0%.
Among the earlier selections that have been since proved unsatisfactory the author names Omega, 1288_{12}, 1587 and Prjadilščik (Spinner).

234. Čiževskii, I. and
Tikhonov, I. 633.52:575(47)
(10 years' work of the State Flax Research Institute).
Len i Konoplja (Flax and Hemp) 1940 : No. 10 : 6–9.
The work of the Institute includes the production of a number of new rust resistant flax varieties with high yield and quality of fibre and also some improved strains of clover.

235. Ovčinnikov and
Razin. 633.52:575(47)
(The 30th anniversary of the Leningrad Flax Research Station).
Len i Konoplja (Flax and Hemp) 1940 : No. 10 : 10–12.
The development of the station since the revolution is described. Among its achievements are the production of flax varieties yielding 25–30% more long fibre of higher quality, some of them resistant to rust. The variety Pobeditel' [Victor] is one of the best but the two newest

varieties have exceeded it in yield of long fibre by 19 and 34·9% respectively. A study has also been made of the local races of linen flax.
Breeding work has also been carried out with red clover.

236. Poperekov, M. 633.52:575(47)
(Newly bred varieties of linen flax).
Len i Konoplja (Flax and Hemp) 1940 : No. 7 : 10–11.
In 1940 all the flax sown in the Soviet Union was of the newly bred varieties; 23 different varieties were sown. The original land races from which they were selected have been preserved at a number of kolhozes as a source of further breeding material.
The more recently produced varieties are rust resistant as well as being superior to the old forms in quality and yield. Tabular data are given of the qualities of the best new varieties, including area of adaptation, yield, fibre content and quality, seed yield, and height of plant, with indication of the breeder and of the initial material.

237. 633.52:582:631.557
Schilling, E. 633.854.54:582:631.557
Die Faserleistung und Ölleistung verschiedener Leinformen. **(The yield of fibre and oil of different forms of flax).**
Angew. Bot. 1942 : **24** : 194–220.
For many years the Kaiser-Wilhelm Institut für Bastfaserforschung (K.-Wilhelm Institute for Bast Fibre Research) has been building up a collection of flax forms from all over the world. The present paper deals primarily with the annual summer forms with indehiscent capsule, termed here *Linum typicum*.
The relative significance of the various types of habit in determining fibre and oil yield is discussed, as well as the possible modification of habit (even though genetically determined) by cultural conditions, including soil and spacing.
Seed weight is specially suitable as a distinguishing feature, since (1) a close relation exists between it and other important form characterististics such as size of seed, capsule, flower and leaf; (2) it is not so readily modified by environmental factors operating during the growth of the plant.
In contrast to Vavilov, the writer therefore adopts the character of seed weight as a basis for distinguishing the main groups, and three sub-groups of *L. typicum* are thereby obtained: *microspermae*, *mesospermae* and *macrospermae* each of which is again sub-divided into *unicaules* and *multicaules* forms. The value of the numerous forms within these six groups is discussed with reference to differences in yield and quality of fibre and of oil, to morphological features of the flower, seed, leaf, etc. and to physiological characters including time of maturity, resistance to cold and fungus diseases, some of which may ultimately prove to be of direct economic importance.
Races of *f. crispum* (crinkled flower) which are being bred by the author have been found very reliable as regards self-fertilization and high number of seeds (average 8–9) per capsule, but he points out that other races of *crispum* exist with the genetic basis for low seed production.
Discussing the merits of various features as indicators of commercial value, the author states that no fixed universal correlation exists between flower colour and yield of fibre, nor between seed colour and oil content; though on the other hand the view that, as compared with the brown seeded forms, the yellow seeded ones generally yield a lighter coloured oil in much demand for many technical purposes may well be justified.
Though up to the present over 100 different individual external form characters have been identified in *L. typicum* in the world collection at the Institute the fibre or oil output of only some of the particularly typical groups is here discussed.
The small seeded (*microspermae*) and long stemmed (*f. longicaules* and *altissimum*) forms, single stemmed (*unicaules*) in field cultivation, are the best for production of the long fibres for spinning (e.g. in the linen industry). Hitherto these forms alone have produced the finest long fibres found, the *nutans* forms being of special importance in this respect. They have the highest fibre content in the stem and give the highest fibre yields in kg. per ha. Though surpassed in yield of seed and oil per ha. by intermediate and by oil producing forms, nevertheless, forms are also found among them which combine good fibre yield with a better yield of seed.

The fibre flaxes best suited to Germany belong to the *longicaules* forms.
The *microspermum* group, which shows very low fibre and seed yields, comprises *inter alia* primitive forms, which are valueless from European standpoints.
The *macrospermum* group includes the *multicaules* and *macropodum* forms which show the highest seed and oil yields per hectare. Some of this group have seeds with a 1,000 seed weight of 8–15 grm. and are outstanding as a source of breeding material for Germany and South-Eastern Europe.
The *mesospermum* group with medium heavy seed weights includes valuable pure linseed flaxes and also forms combining a good yield of both fibre and oil. Such intermediate types (which appear highly promising as breeding material) already occur in many regions of cultivation (as a consequence of spontaneous hybridization) or can be obtained artificially by simple crossing or back-crossing. The different fibre types obtainable from this group may be used in the linen, cotton or rope industries.
The variation in fibre content in the forms of annual *L. typicum* ranges between 15–28% determined on the deseeded, air dry straw, the *unicaules* forms generally being superior to the shorter stemmed *multicaules* types. No universally valid positive correlation between plant height (or length of *free* stem) and fibre content, however exists and *longicaules* types may exhibit a higher fibre content than *altissimum* forms; nor is there any such correlation between oil content and kernel size, seed weight and colour. The forms richest in oil (45–47%) are found in the Indian flaxes with seeds of average size; and, similarly, small seeded forms may show a higher oil content than many very large seeded forms.

238. Opitz, K. and
Maurmann, G. 633.52–2.111–1.521.6
Untersuchungen über die Wirkung der Dürre auf Lein und Sommergerste. (**Investigations on the effect of drought on flax and spring barley**).
Landw. Jb. 1942 : **91** : 576–617.
Comparisons of 3 flax varieties were made as regards length of time before wilting began, time for turgor to be restored after renewal of water supply, water content of the plant at different stages and the yield of plants that had been subjected to wilting. Varietal differences were observed but were not pronounced and the most resistant variety was less tolerant of drought than Isaria barley, which was included for comparison.
The effect of drought upon the fibre and oil content and the critical period of its effect were also investigated.

239. Malykh, P. 633.52–2.183–1.521.6:575(47)
(**Breeding flax for resistance to lodging**).
Len i Konoplja (Flax and Hemp) 1940 : No. 11–12 : 40–42.
A number of new varieties and lines of flax were grown in boxes under uniform conditions and subjected to artificial rainfall for 5–10 minutes at the flowering stage; on the 5th and 13th day after that they were abundantly watered, after which observations were made on the degree of lodging. Both in 1938 and 1939 this treatment revealed clear varietal differences in standing capacity. The results of the tests in boxes agreed well with field observations. The new varieties with the best standing capacity included I–1 and I 2, which are characterized by high fibre yield, and are resistant to rust though not to *Fusarium*; and I 5, which is resistant to *Fusarium* as well as rust and gives a high yield of fibre.

240. 633.52–2.452–1.521.6:575(43)
Straib, W. 632.452:576.16:633.52
Beiträge zur Epidemiologie und Bekämpfung des Flachsrostes. (**Contributions to the epidemiology and control of flax rust**).
Angew. Bot. 1942 : **24** : 16–30.
Experiments with race D 1 of *Melampsora lini* (which has been shown to pass through its whole cycle of development in Germany) indicated that in the course of the gametic phase of the heterothallic fungus new physiological races arise, resulting in this instance in the production of race D 16. The flax variety Kenya which had been regarded as resistant to race D 1, is not resistant to D 16 and exhibited type IV infection. (Incidentally, recent work by the author has shown that this resistance to D 1 and other races is not stable and may be affected

by environmental factors, especially temperature, so as to cause infection of the types II and III).
Race D–16 is therefore the first flax rust race in Europe known to produce type IV infection on Kenya.
The new race differs from its predecessor in a somewhat higher virulence on the flax, "Very pale blue crimped", whilst the Argentine variety continued to show about equal numbers of susceptible and unsusceptible plants.
Further tests on about 400 varieties in the Gliesmarode flax collection revealed other varieties too which, though resistant to D–1, were susceptible to D–16. There were 22 varieties which retained high resistance or immunity in the cotyledon stage. No variety was found that showed higher resistance to D–16 than to D–1, i.e. the phenomenon was another case of increased virulence (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 82). This finding is cited as evidence against the supposition that the varieties (specialized forms) with the narrower host range represent evolutionarily younger forms of the rust species.
D–16 has proved the most virulent of all races so far tested.
In considering control measures for flax rust, the desirability of varieties that would possess not only "stem" but also "leaf" resistance and would remain free from attack at all stages of development is emphasized. The difficulties of breeding such varieties are evident in view of the marked specialization of the fungus, but recent experiments in Germany suggest that apparently the stem resistance is to a large extent independent of the specialization of the fungus and is not markedly affected by environmental factors. In 1941 comparative trials of the resistance of flax varieties to the rust race D–4 were conducted at Gliesmarode, and to race D-15 at Königsberg. In spite of severe conditions as regards infection, Karnobat No. 9 (an oil variety) remained entirely free from infection on the stem and the variety Estanzuela 117, already known to be resistant in the seedling stage, also proved so in the field during the whole period of development. The basis of this stem resistance is being investigated: so far Dr. A. Noll's anatomical studies appear to offer no support for the view that the hyphae penetrate deeper into the tissues of stem resistant types and may thus bring about a latent injury of the fibres.
The breeding of resistant varieties in Germany should certainly be possible.

241. Dillman, A. C. and
Stoa, T. E. 633.52–2.484–1.521.6(77)
Flaxseed production in the North Central States.
Fmrs' Bull. U.S. Dep. Agric. 1942 : No. 1747 : Pp. 19.
Nearly all the varieties of *Linum usitatissimum* grown commercially in the United States belong to the wilt-resistant, short-fibre type and have been developed by selection on the basis of wilt-resistance and high seed yield. The merits of selected varieties are noted.

242. 633.522:575(47)
Demkin, A. 633.522:582
(**The main forms and varieties of hemp.**
Len i Konoplja (Flax and Hemp) 1940 : No. 10 : 26–29.
Varieties yielding 30–40% more than the parents are mentioned among the achievements of Soviet breeders. Descriptions are given of four main types, ranging from the wild hemp at the one extreme to the southern (Italian and Japanese) type at the other.
The new varieties with male and female plants ripening simultaneously are included as a fifth type.

243. Tschanev, K. 633.522:575:581.6:578.08
(**The determination of the quantity of fibre in breeding of hemp for fibre**).
Rev. Inst. Rech. Agron. Bulg. 1939 : **9** : No. 2 : 3–18.
Technological examination of the stem is essential in the breeding of bast fibre plants and should cover (1) the morphology of the plant and the biometrical study of the stem; (2) the quantitative determination of the fibre content of the stem; (3) the technical and microscopic examination of the quality of the fibre. The conditions and methods of obtaining the fibre

will each affect the yield obtainable from a particular strain and thus its ultimate and relative grading.

The present paper deals with the breeding of hemp for fibre. The technique is considered under the following heads: preparation of the stem for processing; obtaining the fibre (methods of retting—including Bredemann's technique—and the requisite laboratory equipment); determination of the yield of fibre from different varieties of hemp (including yields obtained by mechanical separation of fibre from the stem as well as by the two above mentioned processes) and also Hertzog's microscopic determination of the amount of fibre obtained.

In the author's investigation of two selected strains Nos 7 and 13 from the Plovdiv Agricultural Experiment Station, some Bologna hemp found in the Pazardžišk region and some local Mokrišče and some Radomirsko hemps, the amount of fibre was found to vary in the individual variety according to the method by which the fibre was obtained. Moreover the essential importance of technological investigation of the stem of plants for use as initial breeding material to supplement the morphological study of the stems was demonstrated. Instances are given in which plants of the same strain and resembling each other in their biometrical measurements showed considerable differences in yield. The selection of female plants with a good fibre yield can be insured by the above method.

In general the highest percentage of fibre is obtained by individual retting and complete stripping of the fibre from stems, which is impossible with large samples weighing from about a kilogramme or more.

244. 633.525.1:575.42(52)
633.525.1–1.557:581.44

WASHIUMI, F.

(Selection of ramie varieties).

Plant Breed. News 1934 : 2016–20.

The author, who has been on the staff of the Tochigi Station where the study of ramie cultivation was inaugurated in 1918 and the staff of the Miyazaki Station where work on ramie has been in progress since 1929, has examined local varieties at the Tochigi Station as well as Formosan, Korean and Chinese forms. The Formosan varieties yielded three times more than the local ones and selection then revealed that White Skin (from Tainan) gives the highest yield with fine fibres of excellent quality. It is now the most popular variety in Japan proper. Selection work at the Miyazaki Station for varieties suited to Southern Japan led to the discovery of the varieties Hosoguki-Aoshin, which has slender stems with a blue core, and Akashin, which has a red core. The first named yields 46% more fibre than White Skin and five times as much as the local varieties.

245. REGEN, L. 633.526.2:581.162

The development of the embryo sac in *Agave virginica*.

Bull. Torrey Bot. Cl. 1941 : **68** : 229–36.

In *Agave virginica* the embryo sac is formed by three nuclear divisions of a single macrospore. It is therefore of the "normal" type similar to *A. chloracantha* and *A. attenuata*.

E. K. J.

SUGAR PLANTS 633.6*

246. NOLLA, J. A. B. 633.61:575(72.95)

Sugar cane investigations in progress at the Agricultural Experiment Station of the University of Puerto Rico.

Proc. 15th Annu. Mtg. Asoc. Tecn. Azucareros Cuba 1941 : 31–37.

Describes the investigations carried out for the production and testing of new and imported sugar canes in Puerto Rico. E. K. J.

247. BRANDES, E. W.,
TAGGART, W. G. and
KEMPER, W. C. 633.61:575(76.3)

Release of new sugar cane variety.

Sug. Bull., N.O. 1942 : **20** : p. 169.

The merits of C.P. 34–120 are noted. Laboratory tests have shown that it is intermediate between Co. 281 and C.P. 28 19 in regard to fibre content and milling qualities. The variety

* See also Abst. 84.

also has a good record of disease resistance and agronomic tests have proved that it gives good yields, is a vigorous grower and produces especially good stubble crops. It is considered that the variety will prove widely adaptable under Louisiana conditions.

248. Arceneaux, G. and
Davidson, L. G. 633.61:581.6:575
Milling tests of promising unreleased varieties of sugar.
Sug. Bull., N.O. 1942 : **20** : 180–81.

In conducting milling tests Co. 281 is taken as control and results obtained with any given variety are expressed in relative terms. The combined effect of differences in present normal juice extraction and in Brix and sucrose reduction factors between a given variety and Co. 281 in the same tests is resolved to a single numerical factor which has been designated as the varietal correction factor. A variety with normal juice extraction and sucrose reduction factors higher than observed with Co. 281 will have a correction factor greater than 1·00 while a variety maintaining an opposite relationship with respect to Co. 281 will have a correction factor of less than 1·00. Results of milling tests conducted during 1939–41 on some of the more promising unreleased varieties are given in tabular form.

No systematic study has been made of milling quality as occurring among individual seedlings obtained from different crosses. Only seedlings which have proved definitely superior with respect to yield of cane and analysis of the juice are tested, hence the vast majority of inital selections do not reach this stage of the investigations. In the course of the last few years, milling tests were conducted on 8 seedlings from the cross Co. 281 x U.S. 1694 and on 9 from the cross P.O.J. 2725 x C.P. 1165, results of which are summarized. It is considered significant that in only one case out of 8 a seedling from the first-mentioned cross showed a millability factor higher than the base value of 1·00 while all 9 seedlings from the other cross showed correction factors higher than 1·00. The average difference of 0·066 $\pm$ 0·013 observed between seedlings of the two progeny groups is highly significant and indicates a basic difference between the two sets of parents with respect to the transmission of milling qualities in the offsprings. (See also "Plant Breeding Abstracts", Vol. IV, Abst. 450.)

249. 633.61:582
Artschwager, E. 633.61:576.312.35
A comparative analysis of the vegetative characteristics of some variants of *Saccharum spontaneum*.
Tech. Bull. U.S. Dep. Agric. 1942 : No. 811 : Pp. 55.

In view of the utilization of wild forms of *Saccharum* in sugar cane breeding and the consequent collection of clones of *S. spontaneum* in sugar cane stations a system of identification of the forms used was found necessary. Twenty-three clones of *S. spontaneum* imported from Asia and E. Indies—and grown at Canal Point Florida were analysed for vegetative characters. The leaf with its specialized regions, the ligule and dewlap, was found to be the most valuable organ of classification. The ratio between leaf length and width (module) was useful to separate clones regionally. The presence of certain hair groups on leaf sheath, sheath base and blade joint were found to be useful major subdivisions and qualitative differences had to be relied on in separating individual clones. A key is given to cover the 23 clones. Genetic evidence in support of these subdivisions is partly available from chromosome counts, none of which however agree with those reported by previous workers. E. K. J.

250. 633.61–1.524
Summit (Panama, C.Z.) : Experiment Gardens.
Chronica Botanica 1942 : **7** : p. 177.

In co-operation with the Bureau of Plant Industry, U.S.D.A., a reference collection of sugar-cane varieties was established in the Gardens in April, 1939. The principal purpose of the study is to determine the full range of natural variation with this collection used as a basis for developing new useful types by hybridization.

251. Lima Romero, J. J. 633.61–2.3
The bacterial flora of sugar.
Proc. 15th Annu. Mtg. Asoc. Tecn. Azucareros Cuba 1941 : 155–67.

An investigation of the bacterial flora of sugar, its morphology and physiological characteristics. E. K. J.

252. Owen, F. V. and 633.63:575.116.1
Ryser, G. K. 633.63:575.182
Some mendelian characters in *Beta vulgaris* and linkages observed in the Y–R–B group.
J. Agric. Res. 1942 : **65** : 155–71.

The work of Abegg and Owen (cf. "Plant Breeding Abstracts", Vol. VI, Abst. 921) on *Beta vulgaris* had shown the close linkage between the factors *Y*, for production of colour, *R*, red plant colour and *B*, bolting (annual habit). To this linkage group are now added, the factors *Cl*, coloured leaf, *Cv*, coloured veins and *Tr*, trout or spotted leaf and *vl* variegated leaf. The sequence and genetic spacing of these genes were determined. It was found that three other genes *bl*, for black root, *pl*, plantain-like venation and *ru*, russet root were not in the Y–R–B linkage group.

A cytoplasmically inherited type of variegation was also observed. E. K. J.

253. Levan, A. 633.63:576.356.5:575.114
The effect of chromosomal variation in sugar beets.
Hereditas, Lund 1942 : **28** : 345–99.

During experiments on the production of tetraploids in sugar beet by means of colchicine a number of triploids were also obtained. When crossed with diploids the triploids produced forms with all chromosome numbers between 18 ($2x$) and 27 ($3x$). The range of variation was much greater in $3x$ x $2x$ crosses than in the reciprocal, where there was a marked predominance of diploid progeny. In $3x$ x $3x$ crosses all possible chromosome numbers from $2x$ to $4x$ occurred, with a slight excess around the euploid numbers, the mean being below $3x$; 4 plants with numbers above $4x$ also occurred.

An estimation of the vitality of the plants in the field showed a curve, with a peak at $2x$ and smaller ones at $3x$ and $4x$. Pronounced morphological abnormalities were observed in the aneuploid plants below $3x$, while most above this number were fairly normal; occasional diploid plants were also deformed. Similar curves were observed in respect of root weight, top weight and leaf number and size; observations on refraction of sap were inconclusive.

Cell size increased rapidly from $2x$ to $3x$, less rapidly from $3x$ to $4x$, after which no further increase seemed to occur. No correlation between size of plastids and chromosome number was detected. The nucleolus was distinctly larger in the plants with the higher chromosome numbers.

Detailed examinations on 62 trisomic plants showed them to vary considerably, 5 distinct types being described.

Meiosis is described in a number of triploid and diploid individuals; it was regular in all the diploids but one, in which heterobivalents were observed, indicating structural hybridity. The meiotic behaviour of some representative trisomics, of two plants with 20 chromosomes, and of one with 42, is also described.

These results are compared with those reported in other genera and shown to differ from both *Allium* and *Populus*. A statistical examination of the distribution of the chromosome types leads to the conclusion that the ♀ and ♂ gametes function in the $3x$ x $3x$ crosses with quite different frequencies; the $x + 1$ and $x + 2$ pollen classes function much less than in the $2x$ x $3x$ crosses and the proportion of $2x$ pollen grains functioning is greater; the pollen grains with the higher numbers are also more successful in $3x$ x $3x$ crosses. The chromosome optimum for the sugar beet seems to be at $2x$, though the results on this point are not conclusive.

254. Munerati, O. 633.63:581.143.26
The duration of the beet cycle.
Int. Rev. Agric. 1942 : **33** : 177T–214T.

The work includes sections on bolting, its relation to varieties and seed source; the search for progeny which do not run to seed during the first season; separation of types with a stable annual cycle under conditions of normal cultivation; the behaviour of progeny obtained from crossing plants belonging to the annual and biennial cycles; and possibilities of separating strains for autumn sowing for use in large-scale cultivation.

255. Owen, F. V. 633.63:581.162.52:575.11
Inheritance of cross- and self-sterility and self-fertility in *Beta vulgaris*.
J. Agric. Res. 1942 : **64** : 679–98.

The degree of self-sterility in sugar beet was found to be influenced considerably by environment; end of season fertility was pronounced in some self-sterile plants under greenhouse conditions.

A genetical study was made of sterility in the curly-top resistant line 12c. Cross-sterility was often non-reciprocal and it was suggested that duplicate series of oppositional factors were involved; these are designated the *S* and *Z* series and pollen is assumed to be effective if it carries an allelomorph of either *S* or *Z* not present in stigmatic tissue. Not all of the data fit this scheme, however, and it may be that modifying genes are responsible for the discrepancies. A gene S^f was responsible for a highly self-fertile condition. This gene segregated independently of *R*, the gene for red plant and hypocotyl colour. A case in which self-fertility arose in a self-sterile line, presumably by mutation, is reported. S. E.

256. Jancke, A. and
Mikschik, E. 633.63:581.6:575(43)
Über den "schädlichen Stickstoff" der Zuckerrübe und dessen Verteilung in derselben nebst praktischen Folgerungen. (**Noxious nitrogen and its distribution in the sugar beet and some practical conclusions**).
Forschungsdienst 1942 : **13** : 138–49.

The noxious nitrogen content was shown to be higher in the inner portions of the root than in the cortical zones. Experiments to test the agreement between the noxious nitrogen content determined by the Zeiss borer with the results on whole roots showed the borer method to be reliable. Greater variation in noxious nitrogen was observed within the sugar beet varieties than between varieties and though the lowest values were found in the variety Schreiber 22 this is thought to be possibly not a hereditary difference.

STIMULANTS 633.7*

257. 633.71:576.356.5:581.04(92)
Badenhuizen, N. P. 633.524.2:576.356.5:581.04(92)
De toepassingsmogelijkheden van verdubbeling van het aantal chromosomen door middel van colchicine-behandeling bij tabak en Java-jute. (**A study of the possibilities offered by doubling the number of the chromosomes in tobacco and Java-jute by means of colchicine**).
Landbouw 1941 : **17** : 231–51.

A preliminary account of research at the Vorstenlanden Tobacco Experiment Station on the artificial production of tobacco and Java jute with reduplicated chromosomes. The different aims in the cultivation of these two crops and the consequent differences in the application to them of the technique of chromosome reduplication are discussed in a survey of the literature, including Kostoff's work on chromosome length and number in relation to fertility and chromosome reduplication. Published work on sectorial chimaeras, chromosome balance in tetraploids, and relevant research on the effect of colchicine and other chemical substances and the methods of identifying tetraploids are also reviewed.

In the author's investigation with *Nicotiana* representing cigar and also cigarette types, some of the seed was treated with colchicine and some with acenaphthene. In all 30 tetraploids resulted. The two types were still easily recognisable in the tetraploids.

All the 4*n* plants were smaller than normal diploids and their leaves were darker green. Discussing the latter point the author suggests that it may be assumed that the assimilative capacity has been increased so that the tetraploids produce more carbohydrates per unit of leaf surface—a phenomenon which might be desirable in Virginia tobaccos, in which sugar content is an important factor in determining quality. The leaves in the tetraploids were coarser and thicker and had more dense and large hairs while the venation was very irregular. Though all these features have highly undesirable effects on the quality of cigar tobacco, the author records that in the progeny of some of the tetraploids a considerable improvement in

* See also Abst. 86.

leaf type was observed. The increased thickness could only be desirable for Virginia tobaccos where more body is required and further selection might probably be effective as the leaf shape of the tetraploid Virginia in some cases compared favourably with that of the cigar types. Tetraploid Virginia and Vorstenlanden leaf types are illustrated, including defective specimens due to unbalanced chromosome complements. The various aberrant forms described by Lodewijks for diploid tobacco appeared relatively frequently. Variability in tetraploids from the same seed sample was probably due to the variants not having exactly $2n = 96$. In one case from the size of the cells in the root it was clear that a sectorial chimaera had arisen.

The growth of the $4n$ plants was greatly retarded but less so in their progeny. The pollen grains varied greatly in size, and also the flowers, which showed various irregularities in the corolla and other organs.

Depending on the degree of fertility some of the fruits were small and some large. The Virginia tobaccos showed great sterility after chromosome doubling, while the tetraploid Vorstenland lines exhibited considerable fertility. Such sterility however can easily be remedied after a few generations (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 612).

The seeds were larger in the $4n$ plants, and the stomata too.

With colchicine treatment of growing plants the author had little success.

Attributing the polymorphy of *N. Tabacum* to the fact that this species is regarded as a multiple tetraploid by its origin from a cross between *N. silvestris* and *N. tomentosiformis* followed by chromosome reduplication (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1564) the author points out that completely true breeding diploid varieties will be obtainable only by inducing chromosome doubling in haploid plants—a problem which has already been tackled at the Vorstenlanden Experiment Station (N.E.I.).

In all the roots examined from tetraploid Virginia plants never more than 48 chromosomes could be counted, whereas the tetraploid Vorstenlanden roots invariably had 96 chromosomes. The chromosomes in diploid Virginia roots were larger and thicker than in the tetraploid roots. In the last case they lie clearly in pairs. In both groups, however, the pollen grains were diploid so that tetraploidy was confirmed. Various abnormalities that occurred in meiosis are the probable cause of the partial sterility recorded.

After treatment a large number of diploids, apparently representing dominant gene mutations, were observed—no investigation of possible recessive mutations has yet been made. Among the new desirable characters recorded were very light or mat leaf colour, exceptionally fine leaf structure or extra good shape: these were transmitted by the progeny and several such types are to be tested for constancy and quality.

These presumed mutants arose in somatic cells (by seed treatment), in contrast to the mutants previously obtained by irradiation of flower buds with X-rays (cf. "Plant Breeding Abstracts," Volume II, Abst. 116).

The possible value of tetraploid tobacco varieties from the standpoint of quantitative characters is instanced by reference to *Nicotiana glauca* as a potential source of citric acid.

In endeavouring to obtain a tetraploid *Hibiscus cannabinus* L. the object was to combine the superior disease resistance of this species (as compared with *H. Sabdariffa*) with an increased yield of fibre. In spite of the smaller number and size of the chromosomes and the fact that yield of fibre is a quantitative character, the production of tetraploids was not easy. Seed treatment gave no result and even the treatment of germinated seeds produced only pronounced aberrant and swollen seedlings which later grew out of the colchicine effect. Details are given of the effects obtained by this method and by the Warmke and Blakeslee's lanoline–morpholine–colchicine emulsion.

Immersion of growing plants in colchicine solution produced three tetraploid plants.

The tetraploid forms of hemp are not so easy to distinguish as the tetraploid tobacco plants. Their main characteristics, arising partly from the primary colchicine effect, included small dark green leaves, thick and coarsely serrate; seeds considerably larger than normal; stem strong and of normal length in one of the 3 plants, in the other 2, small and branched; corolla broader and more overlapping than usual, anthers mostly sterile and indehiscent; the fruits are as big as the diploid ones and mostly lop-sided owing to unilateral seed development—they contain few (or no) seeds; growth is delayed; the cells of the petals are larger than those of the diploid and the same holds for the stomata in comparable leaves; the tetraploid chromosome number in root tips was 72 as compared with 36 for the diploids and a paired arrangement of

the chromosomes was discernible in both. Though the diploid and tetraploid pollen were the same size, they were clearly distinguishable. Tetraploid pollen is stickier.
The young tetraploid progeny appear to grow as fast as the diploids and greatly resembled them with, however, certain features indicative of superior vigour in the cotyledons and the later leaves, and the calyx. The flowers are to a considerable extent pollen sterile and have noticeably broader and widely extended corollas. The identification can be confirmed by measuring the stomata.
There are not yet enough plants available for an agricultural test of the fibre yield from such plants.
Treatment of vegetative growing plants with colchicine produced many lateral and main branches with partially sterile flowers and fruits with large seeds. Cytological proof that sectorial chimaeras are in question has however not yet been obtained. A comprehensive bibliography is appended.

258. Lang, A. 633.71:581.143.26.035.1:575.11
Beiträge zur Genetik des Photoperiodismus. I. Faktorenanalyse des Kurztagcharakters von *Nicotiana tabacum* "Maryland-Mammut". (Contributions on the genetics of photoperiodism. I. Factorial analysis of the short-day character of *N. Tabacum* Maryland Mammoth).
Z. indukt. Abstamm.- u. VererbLehre 1942 : **80** : 210–19.
The short-day variety Maryland Mammoth was crossed with the variety Java which gives flowers in both long and short day, though somewhat sooner in long day. The F_1 plants all flowered in long day, and a monohybrid segregation occurred in the F_2; dominance of the neutral photoperiod was however incomplete and there was evidence of the presence of modifying factors. The F_1 plants were taller than either parent and the non-flowering F_2 plants were also taller than Maryland Mammoth. Under short day the flowering time of the F_2 population gave a continuous unimodal curve and Mammoth types were absent altogether. The gigantism of the mammoth is thus seen to be the result of the short-day reaction which is thought to be conditioned by hormone action; the short-day forms occurring in other tobacco varieties are apparently produced by a similar gene, which has evidently arisen fairly frequently by mutation.

259. Shmuck, A. A. and
Borozdina, A. 633.71:581.192:576.16
Alkaloids of various plant species within the genus *Nicotiana*.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 62–65.
Having elaborated some new methods for the identification of the alkaloids of the tobacco plant, the Institute for Genetics of the Academy of Sciences of the U.S.S.R. has analysed 42 species of *Nicotiana* obtained from various geographical sources (including Australia and America) and grown on the Institute's experiment plot.
The results, which are presented in tabular form, show four groups: (1) species whose main alkaloid is nicotine; (2) species whose main alkaloid is nornicotine; (3) species containing nicotine and nornicotine; and (4) species whose main alkaloid is anabasine.

260. McMurtrey, J. E. (jun.),
Bacon, C. W. and
Ready, D. 633.71:581.6
Growing tobacco as a source of nicotine.
Tech. Bull. U.S. Dep. Agric. 1942 : No. 820 : Pp. 39.
Consideration is given to the relative efficiencies of species, varieties and strains for nicotine production. The possibility of further increasing nicotine yields from *Nicotiana rustica* is of theoretical interest. Greater yields per acre of dry material may be obtained by producing strains with longer leaves or by increasing the thickness or density of the leaves.
The physiological limit of percentage content of nicotine may have been approached in the 12·80% reported.

261. 633.73:576.356.5:581.04
MENDES, A. J. T. 633.51:576.356.5:581.04
Duplicação de cromosomios em café, álgodão e fumo pelo uso da colchicina. (**Duplication of chromosomes in coffee, cotton and tobacco by means of colchicine**).
An. 1ª Reun. Sul-Amer. Bot. Rio de J. 1938 : **3** : 331–49.

Colchicine treatment of germinating seeds of *Coffea arabica* ($2n = 44$) gave rise to certain plants with $2n = 88$; similarly $2n = 104$ plants were obtained in *Gossypium hirsutum* and $2n = 52$, plants in *G. herbaceum*. Solutions of 0·3% colchicine were used for coffee and 0·15% for cotton. The cytological examination of the treated tobacco plants is not yet completed.

262. HOUK, W. G. 633.73:582
Nomenclatura dos cafeeiros. Lista de referências e bibliografia. (**Coffee nomenclature. List of references and bibliography**).
Bol. Téc. Inst. Agron. Campinas 1939 : No. 63 : Pp. 49.

A list is given of the specific names used in the genus *Coffea*, with references to the original source and the citation in Index Kewensis, a list of synonyms, a list of authorities, with indications of the species for which they are responsible and of their abbreviations, and a bibliography of general references on coffee systematics.

263. MENDES, J. E. T. 633.73–1.557(81)
Ensaio de variedades de cafeeiros. (**Coffee variety test**).
Bol. Téc. Inst. Agron. Campinas 1939 : No. 65 : Pp. 36.

A comparison has been made of Café Nacional, the original form of *C. arabica* L. var. *typica* Cramer introduced into Brazil, with a number of later introductions or mutations, 250 plants of each variety being compared in the years 1935 to 1938. The results show that the variety Maragogipe was later in maturity than the others, yielded less but had the largest beans. The varieties Bourbon and Yellow Bourbon gave the highest yields. All varieties were equally good in liquoring quality.

Statistical examination of the results shows that the excess yield of Bourbon and Yellow Bourbon and the deficit of Maragogipe are significant, but the inferiority of the latter variety was much less marked in the fourth year than in the earlier years.

264. CASTELLANI, E. 633.73–2.452–1.521.6
A proposito della presunta resistenza di varietà brasiliane di Caffè alla *Hemileia vastatrix*. (**Regarding the supposed resistance of Brazilian varieties of coffee to *H. vastatrix***).
Agricoltura Colon. 1942 : **36** : 100–01.

The author admits the desirability of growing coffee varieties resistant to leaf disease but emphasizes the complexity of the problem of finding them. Statements to the effect that Brazilian varieties are all resistant are regarded as misleading and hence mischievous.

265. HEEGER, E. F. and
BAUER, K. H. 633.75:581.6(43)
Untersuchungen über den Morphingehalt der zum Handel zugelassenen und einiger anderer Mohnsorten und die Möglichkeit der Opiumgewinnung im Deutschen Reich. (**Investigations on the morphine content of commercial and other poppy varieties and the possibility of opium production in Germany**).
Landw. Jb. 1940 : **90** : 397–429.

A full account is given of the opium poppy and its cultivation in Germany for opium and oil; this includes a discussion of the existing varieties and the methods of distinguishing them. Tests of the morphine content of 22 varieties showed the blue seeded varieties to be richer in morphine than the white, though the latter have a higher opium content. The varieties with spherical capsules have the highest morphine contents. Although the morphine content is hereditarily conditioned, it is also strongly influenced by environment.

266. HOLUBINSKY, I. N. 633.79:581.142:581.036:578.08
Influence of temperature alternation on the germinable power of hop seeds (*Humulus lupulus* L.).
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 85–86.

The improvement of the germination capacity of hop seed is an important consideration in hybridization of hops, a crop in which usually the percentage germination is very low. While studying the effect of high temperature on mutation in hops (cf. "Plant Breeding Abstracts", Vol. X, Abst. 839) the author incidentally noticed that when the temperature was varied during soaking of the seed the amount of germination increased; and he subsequently devised a method of treating hybrid hop seed under a series of alterations of temperature (beginning with a low temperature), which resulted, under optimum conditions of temperature and humidity, in a germination percentage of 91·5.
It is important to initiate the germination process with a low temperature for 5 days, so that the seeds may first swell before being transferred to the optimum temperature (20°–25° C.) for germination. Three or four days after transfer 90% germination may be obtained.

CONDIMENTS 633.84

267. NISSLEY, C. H. 633.842–2.8–1.521.6(73)
New Jersey vegetables.
Hort. News, N.J. 1942 : **23** : p. 1420.

Capsicum variety Rutgers World Beater No. 13, selected by Prof. Schermerhorn of the Department of Vegetable Gardening at the Experimental Station, New Jersey, is a pepper resistant to mosaic. E. K. J.

OIL PLANTS 633.85*

268. PIETSCH, A. 633.85:582(43)
Beitrag zur photographischen Darstellung, Farbbestimmung und Bedeutung der ölhaltigen Samen von in Deutschland wachsenden Pflanzen. (**Note on the photographic representation, colour determination and importance of the oil containing seeds of plants growing in Germany**).
Landw. Jb. 1941 : **91** : 369–417.

The article gives a full account of the oil plants, old and new, grown in Germany: their origin, names, areas of cultivation, utilization and breeding problems, with descriptions of the species, photographic illustrations of the seeds and data regarding their dimensions, exact colour, oil content and methods of extraction. Similar details are given for a number of wild plants that are used for oil production.

269. VASSIL'JEV, V. 633.85–1.524(47)
Eine neue ölhaltige Kultur.—*Crambe hispanica* L. (**A new crop containing oil—*C. hispanica* L.**).
Öl- u. Fett-Ind. 1940 : No. 2 : 32–33.

Crambe hispanica L. reaches a height of 150 cm. and has deep-growing main roots. The vegetation period of 68–93 days is considerably delayed in wet summers. The seeds are very susceptible to frost. In cultivation experiments in different parts of Russia the seed yield varies between 9·33–21·4 dz/ha. The analysis of the seeds shows: kernel 75·4%, husks 24·6%, oil content 47·2%. R. M. I.

270. SCHEIBE, A. 633.853.48–1.524
Die Oelrauke (*Eruca sativa* Lam.), eine für Deutschland neue Oelpflanze. [**The oil rocket (*E. sativa* Lam), an oil plant new for Germany**].
Landw. Jb. 1941 : **91** : 199–233.

The article surveys the existing knowledge of the plant as regards its names, systematic position, geographical and ecological distribution and origin of the cultivated form from the wild. The views of Vavilov have been confirmed by the results of the German Hindu Kush expedition. Experiments, started in 1936, on the cultivation of the plant in Germany indicate the possibility of cultivating it with success in certain, especially mountainous, areas; seeds

* See also Absts 79, 83, 86 and 237.

grown in Germany had a lower protein content but a higher oil content than seeds from Afghanistan. The species is also regarded as a promising fodder plant.
Observations made with an eye to later breeding operations have shown the existence of wide variations in time of flowering and photoperiodic reaction, Indian forms giving neutral and Afghan forms pronounced long-day reactions; the latter are the only forms suitable for breeding for European conditions.

271. Scott, F. M. and
Reynolds, M. 633.853.55:576.353:581.04
Traumatic acid and mitosis in *Ricinus communis*.
Amer. J. Bot. Suppl. 1941 : **28** : p. 5s. (Abst.).
"When traumatic acid (0·1% aqueous) is injected into the hollow internodes of *Ricinus communis*, active cell division is apparent within 48 hours. The new walls arise periclinally, and the zone of dividing cells is thus clearly marked by concentric rings. Mitotic activity varies in internodes of different ages".—Authors' summary.

272. Krug, C. A. and
Mendes, P. T. 633.854.46:575.42(81)
Nota sôbre a variabilidade do tungue (*Aleurites Fordii* Hemsley). [**Note on the variability of tung (*A. Fordii* Hemsley)**].
An. 1ª Reun. Sul-Amer. Bot. Rio de J. 1938 : **3** : 351–61.
An extensive programme of selection has been started with tung, based on type of branching, annual yield, number of ♀ flowers and fruits per cluster, size and weight of seed and fruit, percentage of kernel and oil content in the seeds. Figures are given showing the degree of variation in all these characters. The per cent. of kernel for instance varied between 32·46 and 62·46% and the oil content of the kernel from 38·01 to 68·54%.

273. Perry, B. A. 633.854.559:576.312.35:576.356.5:582
Chromosome number relationships in the genus *Euphorbia*.
Amer. J. Bot. Suppl. 1941 : **28** : 4s–5s. (Abst.).
"Somatic chromosome numbers have been determined for 67 species of *Euphorbia*. The following $2n$ numbers have been observed: 12, 14, 16, 18, 20, 24, 28, 30, 40, 42, 56, 60, ca. 100, and ca. 200. The numbers determined are inferred to belong to a primary system of $n = 8$ and secondary systems of $n = 6$, 7, 9, and 10. The 6-, 7-, 9-, and 10-lines arose by aneuploid loss or gain to establish present-day species. The highest degree of polyploidy has been reached in the 7- and 10-series; in only one case has polyploidy been observed in the 6-series and in no case in the 8- and 9-series. The frequency of polyploidy in the genus is ca. 39%. Intraspecific polyploidy is rare, having been observed only in *E. dentata* Michx., which had diploid, tetraploid, and octaploid races. Numerical data on chromosome numbers indicate that higher basic numbers are associated with the perennial condition. Basic chromosome number and chromosome morphology suggest that *Euphorbia* should be divided into several genera, at least three, as was suggested by Croizat in 1940". Author's summary.

274. Zakharov, B. S. 633.854.78–2.5–1.521.6:581.143.26.035.1
Influence of daylength on susceptibility of sunflower to affection with broom-rape.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 446–47.
Sunflower grown under conditions of short photoperiod is very susceptible to broom rape attack. The present investigation made with two varieties Dwarf and Giant under conditions of 9- and 13-hour photoperiods showed that this increased susceptibility was not related to acceleration of development of the host plant under short photoperiod. Biochemical changes in the parasite or host are mentioned as possible explanations of this finding. Further research is contemplated.

MEDICINAL PLANTS 633.88

275. Porterfield, W. M. (jun.) 633.88(51)
China's contribution in medicinal herbs.
J. N.Y. Bot. Gdn 1942 : **43** : 223–30.
The important medicinal plants of China are enumerated and their importance in western medicine is described. E. K. J.

276. JENSEN, H. W. 633.88:576.312.34
Heterochromosome formation in *Benzoin aestivale.*
J. Elisha Mitchell Sci. Soc. 1941 : **57** : 202–03.
An unequal pair of chromosomes which are heterochromatic was found in the dioecious plant *Benzoin aestivale* $2n = 24$. One of these was extruded into the cytoplasm in approximately 50% of PMC. The pollen grains were calculated to be of three types, one quarter deficient in a chromosome and inviable, one half containing the smaller of the heterochromosome pair and one quarter containing the larger. The author states that "the description of a heterochromosome in this practically dioecious species of *Benzoin* is not to be taken as a claim for the presence of sex chromosomes". E. K. J.

277. LONGACRE, D. J. 633.881.6:576.312.35
Somatic chromosomes of *Aconitum noveboracense* and *A. uncinatum.*
Bull. Torrey Bot. Cl. 1942 : **69** : 235–39.
The purpose of the work was to determine the chromosome number of the species of aconites indigenous to the Appalachian mountains. It was possible to obtain authentic material only of the above two species.
The diploid chromosome number in somatic tissues is 16. This confirms the results of earlier workers that the basic number for these plants is 8.
Data on chromosome length are also recorded.

RUBBER PLANTS 633.91*

278. DEMMON, E. L. 633.912:575(8)
Rubber production opportunities in the American tropics.
J. For. 1942 : **40** : 207–10.
Among the steps taken by the U.S. government to develop S. American rubber production is the establishment of a breeding garden in Haiti, where clonal material of the best East Indian varieties of *Hevea brasiliensis* are being tested and propagated. The Ford and Goodyear companies, among others, have large experimental plantations in Brazil, Costa Rica and elsewhere and information and planting material are supplied to the government.

279. LOOMIS, H. F. 633.912:581.481:578.08
Methods of splitting Hevea seedlings.
J. Agric. Res. 1942 : **65** : 97–124.
The experiments here described confirm the superiority of the Gambar method to the Ramaer technique. The merits of certain modifications introduced into the standard Gambar method are discussed. (See Horticultural Abstracts).

280. 633.913
†**(Kok saghyz cultivation).**
Sel'khozgiz, Moscow 1941 : Pp. 98.
Details are given regarding the properties, cultural requirements, control of pests and harvesting.

281. 633.913
U.S.A.: Russian dandelion seed arrives for rubber test.
Chronica Botanica 1942 : **7** : 180–81.
"A small shipment of Russian dandelion (Kok-Saghyz) seeds for experimental planting has been received by the Bureau of Plant Industry, the U.S. Dept. of Agriculture announced. The first seed shipment, a little over 100 pounds, came by air and will be supplemented soon, it is expected, by a similar shipment of about 400 pounds. Additional shipments have been promised.—The Department emphasizes that these shipments are entirely for experimental plantings—to supplement the meagre information now available in this country on the possibilities of kok-saghyz as a rubber producer. The seed will be tested this summer at Agricultural Expt. Stations in about 20 Northern states, Canada and Alaska, under climatic conditions like those of the areas in the U.S.S.R. where the dandelion is now being grown.—The

* See also Abst. 86. † A full translation of this paper is on file at the Bureau.

Russian dandelion may be grown as an annual, but it is believed yields of only 30 to 50 pounds of rubber per acre may be expected, although somewhat higher yields occasionally have been reported. It has a leaf similar to the common dandelion of this country, but a much larger root".

282. BRANDES, E. W. 633.913:575(73)
Rubber from the Russian dandelion.
Agric. Amer. 1942 : **2** : 127–31.

A popular account is given of *Taraxacum kok-saghyz* and its distinction from *T. officinale* is noted. A programme of research has been initiated for cultivation of the plant in U.S.A. and geneticists and plant breeders will consider the possibilities of improvement.

283. TOBLER, F. 633.913–1.524:633.522(43)
Ein weiterer Beitrag zur Kenntnis des sogenannten Gummihanfes. (**A further contribution to the knowledge of the so-called "rubber hemp").**
Ber. Dtsch. Bot. Ges. 1941 : **59** : 46–51.

Further examples of the so-called "rubber hemp" (Gummihanf) are described, in which in certain layers of the stem lignin is replaced by cellulose. R. M. I.

FRUITS 634*

284. LAMMERTS, W. E. 634:575:578.08
Embryo culture an effective technique for shortening the breeding cycle of deciduous trees and increasing germination of hybrid seed.
Amer. J. Bot. 1942 : **29** : 166–71.

Embryo culture, as compared with usual stratification methods, results in a much higher percentage of germination in most apricot and peach crosses, thus giving a better random sample of genetic diversity.

In some crosses a large percentage of normal looking embryos was found which would not respond to embryo culture. Some of these may be germinated if given a cold storage treatment of 6 weeks at 40° F. while still in culture bottles.

Hybrid trees can be brought into flower 2 years from the time of cross pollination. Self-pollinations and both male and female back crosses can then be made every 2 years.

Certain modifications in embryo culture technique which have proved useful in avoiding failures are presented.

285. VERNER, L. 634.11:575(79.6)
The Idared apple.
Circ. Idaho Agric. Exp. Sta. 1942 : No. 84 : Pp. 3.

A description is given of the Idared apple, a cross between Wagener and Jonathan. E. K. J.

286. GRIGGS, W. H. and
SCHRADER, A. L. 634.11:581.162.3
Comparison of certain varieties as pollenizers for the Delicious apple.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 87–90.

Varieties most suitable for pollinating Delicious apple are Rome Beauty, Jonathan, and Gallia Beauty.

The advantages of expressing fruit set in terms of percentage of total growing points have been brought out. The value of a statistical approach to future pollination studies is indicated.

287. HARTMAN, F. O. and
HOWLETT, F. S. 634.11:581.45:575.11
An analysis of the fruit characteristics of seedlings of Rome Beauty, Gallia Beauty, and Golden Delicious parentage.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 241–44.

That Rome Beauty and Gallia Beauty have a heterozygous genetic constitution is substantiated by these results, which also indicate that a number of factors or genes, both

See also Abst. 80.

cumulative and differential, govern the inheritance of the characteristic analysed. Rome Beauty and Gallia Beauty are of limited value in breeding work where good colour and dessert quality are desired as they fail to transmit these features to a satisfactory extent.

288. Lantz, H. L. and
Pickett, B. S. 634.11-2.111-1.521.6:575
Apple breeding: variation within and between progenies of Delicious with respect to freezing injury due to the November freeze of 1940.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 237–40.
The data indicate that hardiness is conditioned by a complex situation, and that the multiple factor hypothesis must be relied upon to explain the range of hardiness found in Delicious progenies. Hardy varieties appear to transmit their hardiness to a relatively high percentage of trees, even when crossed with a tender variety such as Delicious. Some of the seedling trees produced by crossing two tender varieties may be hardier than either parent.

289. Pickett, B. S. and
Lantz, H. L. 634.11-2.111-1.521.6:575(73)
Apple varieties: behavior of two hundred varieties following the freeze of November, 1940.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 212–14.
"The record furnishes substantial data justifying plant breeding programs and encouraging further breeding efforts. Haralson, a product of breeding in Minnesota; Secor, Edgewood, Hawkeye and Sharon, Iowa seedlings; and Cortland, Kendall, Milton, Lobo, Melba, Turley and Lawfam, definite products of other breeding programs, comprise 75% of the worth while varieties which promise a high recovery value".

290. MacDaniels, L. H. 634.22:581.162.3
Notes on the pollination of the Italian prune.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 84–86.
The Italian prune (or Fellenburg prune) is, in Oregon and Washington, the principal variety used for drying. Further information was required on self-fruitfulness of the variety and also as to the pollen value of several of the more recently introduced varieties, particularly the Stanley. A table records the set of fruit obtained in Italian prune with different pollens. This variety is regarded at least as partially self-fruitful, but fruit setting can be improved by cross pollination.

291. Gustafson, F. G. 634.23:581.162.5:577.17
Concentration of growth hormone and fruitfulness in the Montmorency cherry.
Proc. Nat. Acad. Sci. Wash. 1942 : **38** : 131–33.
A study was made of the flowers of three trees of a high yielding selection and of three of a low yielding form that had arisen as a bud sport. The ovaries of the fruitful trees contained 23% more growth hormone than those of the barren trees in 1939 and 3 times as much in 1941; in 1940 the difference was inconclusive.

292. Scott, D. H. and
Cullinan, F. P. 634.25:581.45:575.11.061.1
The inheritance of wavy-leaf character in the peach.
J. Hered. 1942 : **33** : 293–95.
The wavy condition of the leaf in the peach, associated with weak growth and dwarf habit, was found to be a recessive character controlled by a single factor. E. K. J.

293. Bailey, J. S. and
French, A. P. 634.25:581.46:575.11
The inheritance of blossom type and blossom size in the peach.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 248–50.
The showy—non-showy characters in *Prunus persica* are controlled by one pair of genes, *Shsh*, and blossom size is controlled by a different pair or pairs of genes.

294. YARNELL, S. H. 634.3:575.127.2:575.114
Leaf segregation in Citrus-Poncirus hybrids.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 259–63.

In most hybrids between *Citrus* and *Poncirus*, the sexual embryo seldom reaches maturity, and this leads to the development of many seedlings of maternal type. The data presented include tables of segregation of leaf types in open-pollinated citrange (a hybrid between *P. trifoliata* and *C. sinensis*) seedlings; types of segregates and proportion of seedlings segregating in citrange and citrumelo (trifoliate orange-grapefruit cross). From the point of view of segregation the latter is more suitable for plant breeding than is citrange.

295. BRIEGER, F. G.,
MOREIRA, S. and
LEME, Z. 634.31:575.247:581.165.71
Estudo sobre o melhoramento da laranja "Baía" III (Conclusão). [**Study on the improvement of the Bahia orange. III (Conclusion)**].
Bragantia, São Paulo 1941 : **1** : 567–610.

Continuing the previous studies (cf. "Plant Breeding Abstracts", Vol. X, Abst. 221), it was seen that certain trees again gave consistently low values for fruit size, far more frequently than would be expected on mere chance, and others gave consistently high values. The classification of the trees into the 3 types Bahia, Araras and Piracicaba is thus confirmed. Certain variations within the groups are shown to be due to soil differences; the fruits borne on the earlier formed branches of a tree also tend to be smaller than those on later branches. The negative correlation between size of fruit and number of fruits per tree was confirmed. Most trees showed considerable variation from year to year both in size and number of fruits; 4 trees were classed as the Araras type in all 4 years however and these trees gave only 9% of fruits too large to be marketable; 86% of their fruits were small and of marketable size. There are no indications that the three types are genotypically distinct and it is thought more probable that they result from differences in the stocks on which the buds were grafted. Differences have been observed between seedlings of citrus rootstocks even when these have arisen by polyembryony.

296. BOU BONO, B. 634.322:581.48:581.162.3
Algunas observaciones sobre el número de semillas de la mandarina "Clementina". (**Some observations on the number of seeds in the Clementine mandarin**).
Bol. Inst. Invest. Agron. Madr. 1939 : **2** : No. 3 : 195–207.

The number of seeds in the fruit of the Clementine varies from zero to 18. Flattened fruits with smooth skin invariably contained fewer seeds than elongated fruits. Self-pollination of the Clementine gave few fruits and those that were formed also contained few seeds. Pollination with other varieties with few seeds gave fruits with few seeds and pollination with pollen from different flowers of the same tree also gave fruit containing seeds.

297. CONDIT, I. J. 634.37:582
Fig characteristics useful in the identification of varieties.
Hilgardia 1941 : **14** : 1–69.

This short monograph (which includes an extensive bibliography) deals with the history of the fig; the classification of the various types of figs and their nomenclature; the fruit and its structure and internal and external features and its quality; caprification; the latex of the fig (its properties and its enzyme constitution); the leaf and its form and structure and its taxonomic significance; and finally the characters of the tree; including growth habit, productivity, hardiness, and its morphological characters and their taxonomic value.

298. EVREINOFF, V.-A. 634.451
Le plaqueminier du Japon ou kaki, botanique, variétés, culture, utilisation. (**Japanese kaki, its botany, varieties, cultivation and utilization**).
Rev. Hort. Paris 1941 : **27** : 343–46, 367–69, 399–402, 435–36, 463–66, 495–97.

The fruits of *Diospyros Kaki* are extremely rich in vitamins and sugar, especially in the best varieties, of which over 2,000 are said to exist in China. Notes are given on its origin and

evolution, on the characters of the plant and of the fruit, its chemical composition, the sex relationships of the flowers in the different varieties, the importance of pollination in fruit production and its influence on the qualities of the fruit. The attempts of various authors at classification of the varieties are reviewed and the principal varieties are described and illustrated. Details are given regarding the methods of cultivating the plant and of utilizing the fruit.

299. FLETCHER, W. F. 634.451:575(73)
The native persimmon.
Frms' Bull. U.S. Dep. Agric. 1942 : No. 685 : Pp. 22.

A change in the status of native persimmons which has arisen since the original issue of this bulletin in 1915 probably indicates a decrease in interest in this fruit. In 1915 there were 13 native varieties named, most of which had been commerically propagated; by 1941, however, less than half of this number were being listed by nurserymen.
Possibilities of improvement in the fruit are discussed, with special reference to the need for obtaining pollen-bearing trees of known parentage.

300. BALDWIN, J. T. (jun.) and 634.451:576.312.35
CULP, R. 634.451:576.356.5
Polyploidy in *Diospyros virginiana* L.
Amer. J. Bot. 1941 : **28** : 942–44.

The species varies in habit (from a shrub to a tree with a maximum height of about 130 ft.) and differs considerably in characters of fruit, seed, foliage, etc. Two chromosome number races have been found in which $2n = 60$ and $2n = 90$. The existence of these races has been implied in earlier publications (Hague, Bot. Gaz., 1911 : **52** : 34–44, and Namikawa, I. et al Jap. J. Bot. 1932 : **6** : 139–72). The relative distribution of the two races in U.S.A. is indicated on a map.
The importance of the plant for the study of stock-scion relationships in regard to polyploidy is stressed, and in this connexion it is contended that cytogeographic surveys of other persimmon species should be made.

NUTS 634.5*

301. MCKAY, J. W. and 634.51:576.354.4:576.356
MCKAY, H. H. 634.51:576.312.35:575.127.2
Microsporogenesis in *Juglans intermedia* Carr.
Amer. J. Bot. Suppl. 1941 : **28** : p. 4s. Abst.

"The staminate catkins of two trees of *Juglans intermedia* Carr. produce 75% abnormal pollen grains. Irregular pairing and distribution of the chromosomes at the reduction division in microsporocytes result in pollen grains of variable size and chromosome number as indicated by chromosome counts at the second meiotic metaphase. Lagging unpaired chromosomes frequently form microcytes. The somatic chromosome number is 32, as in other walnut species, but the trees are highly infertile. It is concluded that these trees are natural hybrids between two species of walnut that are unlike genetically, probably *J. regia* L. and *J. nigra* L.". —Authors' summary.

302. PASCUAL, A. 634.551:582(73)
Almond growing throughout the world: (3) The United States.
Int. Rev. Agric. 1942 : **33** : 165T–70T.

An endeavour has recently been made to reduce the number of *Prunus amygdalus* varieties in order to standardize production. In 1927 there were 60 cultivated varieties while it was considered that a dozen would meet market requirements adequately. It was therefore necessary to increase yield per hectare in order to reduce production costs and to cultivate few varieties to facilitate the sale of the product through standardization of types. In 1938 a systematic study was made of the almond varieties cultivated in the United States. The qualities of many are noted.

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* See also Abst. 82.

303. 634.58:575(49.7)
ILIEV, P. 634.58–1.524(49.7)
(What variety of pea-nut should we sow in our country?)
Zemledelie, Sofia 1941 : **45** : 79–82.

In order to obtain a variety of pea-nut suited to the soil and climate of Bulgaria and also high yielding and of good quality, comparative trials were conducted at the Sadovo Agricultural Experiment Station. Among the varieties included were two local selections, called Karlovski, an erect form (of the Valencia type), and a prostrate form (of the Virginia Runner type) which is fairly commonly found in the Sr. Vrač and Petrič districts.

In one group of experiments, on a 5-year average Karlovski gave a 30% higher yield than the prostrate type and the latter also showed great variation in the yield because it is a less reliable yielder and also requires a longer period for growth and was therefore unsuited to the Bulgarian climate. It has other defects as well.

In another experiment the two varieties with the highest oil content were Komun Rokso and the Spanish Light variety, while the local prostrate form came last; the local erect type however attained third place. Nevertheless, the Karlovski variety is recommended for cultivation, as the other two varieties showed undesirable features in the quality of their nuts. These are however being used at the Station with good results for crossing with local types to obtain more productive improved varieties that are earlier and of better quality.

304. 634.58:581.47:575.11–181
ILIEFF, P. 634.58:581.48:575.11.061.6
Genetische Untersuchungen an der Erdnuss (*Arachis hypogaea* L.). Bohnenfarbe- und Fruchtgrössenvererbung. [**Genetical investigations of the groundnut (*A. hypogaea* L.). Inheritance of seed colour and fruit size**].
Züchter 1942 : **14** : 141–45.

The structure of the flower and the method of hybridization are outlined. Flesh-coloured seed coat was dominant to cream and dark lilac; in some crosses dominance was complete, with monohybrid segregation, in F_2, others gave 1 : 2 : 1 ratios. The small fruit of the Spanish white variety was dominant, and conditioned by multiple factors. Transgression was observed in fruit form but not in fruit size. Some large fruited hybrids have been selected.

OTHER FRUITS 634.6*

305. HODGE, W. H. 634.6:582(72.97)
A synopsis of the palms of Dominica.
Caribbean Forester, Puerto Rico 1942 : **3** : 103–09. (Mimeographed).

The palm flora of Dominica is composed of only seven species representing five genera, most of them very localized. The palms serve as a source of food and shelter; one species of Euterpe has an edible bud (mountain cabbage), and the leaves of Geonoma furnish valuable roofing material. A key is provided for the identification of the species.

306. COOK, O. F. 634.6–1.524(86)
A new commercial oil palm in Ecuador.
Nat. Hort. Mag. 1942 : **21** : 70–85.

The name *Ynesa colenda* is suggested for the material collected in the coastal plain of Ecuador, the local name being "palma real". The new palm which is described and illustrated may prove important as a natural resource and worthy of domestication as a food and fibre crop.

307. BONDAR, G. 634.61:633.856:575(81)
As cêras no Brasil e o licurí *Cocos coronata* Mart. na Bahia. (**Waxes in Brazil and *C. coronata* Mart. in Bahia**).
Bol. Inst. Cent. Fom. Econ. Bahia 1942 : No. 11 : Pp. 86.

C. coronata is being used more and more extensively as a source of oil, and since 1937 as a source of wax. Data are given regarding the various sources of vegetable wax, including a number of South and Central American palms, and of the methods of extracting; the new

* See also Abst. 82.

process of scraping the leaves has proved very successful with *C. coronata* and other palms and is described.
The history of the licurí palm, *C. coronata*, is discussed, with extracts from early literature on the palm, its uses, botanical position and physiology. The palm is exceedingly hardy and drought resistant and will grow in localities where few if any other plants will survive; it furnishes a useful fibre as well as oil and wax, the interior of the trunk is edible, the fruit can be eaten both fresh and ripe and the ripe kernel is fed to pigs and poultry. The leaves, in addition to being used in half-a-dozen different ways when dry, can also be fed green to stock. The composition and characteristics of the wax, which closely resembles that of *Copernicia cerifera* Martins, are discussed.
Great variation has been observed in the size of fruit, thickness of shell, size of kernel, thickness and flavour of the pulp and in the wax content. Great possibilities are envisaged in (1) selecting forms with improved qualities for human consumption (crossing with *C. eryospatha*, a nut which is superior in flavour, is also recommended); (2) selecting for higher yield of oil and (3) selecting for higher yield of wax.

308. Mazzolani, G. 634.63:576.16
La patria dell'olivo. Alcuni aspetti dello studio botanico dell'olivo (*O. europaea* L.). [**The home of the olive. Some aspects of the botanical study of the olive (*O. europaea* L.)**].
Ital. Agric. 1942 : **79** : 367–72.

An examination of the area of distribution of the species of *Olea* shows it to be discontinuous. A primary centre of origin appears to be in the zone between Turkestan, Pamir and Armenia. The Mediterranean area seems to be a secondary centre, and species such as *O. Laperrini* are regarded as of recent origin.

309. Díaz y Muñoz, J. and
Burgos Peña, P. 634.63:581.6(46)
Estudio de algunas variedades de aceitunas en la cosecha 1934–35. (**Study of certain olive varieties of the 1934–35 crop**).
Bol. Inst. Invest. Agron. Madr. 1939 : **2** : No. 3 : 241–52.

Data are given on oil content and iodine number, volume and weight of fruit, and content of stone and flesh for a number of Spanish olive varieties.

310. Guillaumin, A. and
Guinet, C. 634.65:577.16
Actinidia chinensis Planchon, Liane fruitière d'extrême-orient intéressante pour nos cultures et pour l'hygiène alimentaire. (***A. chinensis* Planchon, a fruiting far-eastern creeper of interest for cultivation and for dietetic hygiene**).
Rev. Hort. Paris 1941 : **27** : 315–19.

Randoin, L. and
Boisselot, J.
La valeur anti-scorbutique de fruit comestible d'*Actinidia chinensis* (Planchon) source exceptionnellement riche en vitamine C. (**The anti-scorbutic value of the edible fruit of *A. chinensis* Planchon, an exceptionally rich source of vitamin C**).
Ibid 1941 : **27** : p. 319.

A description is given of the species, which grows vigorously and bears abundant fruit in the vicinity of Paris; the fruit can be eaten raw, in tarts or in preserves and is one of the richest sources of vitamin C yet known (300 mg. per 100 grm. fresh weight).

311. Traub, H.,
Robinson, T. R. and
Stevens, H. E. 634.651:575(73)
Papaya production in the United States.
Circ. U.S. Dep. Agric. 1942 : No. 633 : Pp. 36.

Until superior varieties of *Carica Papaya* are more generally available, papaya culture as an

industry cannot be established on a sound horticultural basis. This work includes information on breeding objectives, standardization of varieties, description of varieties, propagation and planting.

312. 634.651:577.8:575.11

Papaya production in the Hawaiian Islands.

Bull. Hawaii Agric. Exp. Sta. 1941 ; No. 87 : Pp. 64.

Carica Papaya is considered to have originated in Mexico as a hybrid between two species. Its chromosome number is $2n = 18$ and this number is also reported for *C. candamarcensis, C. cauliflora, C. chrysopetala, C. pellata, C. petagonia* and *C. quercifolia.*

The papaya tree requires 10–14 months from germination of seed to fruit production. Sexually papaya is polygamous and consists of 4 distinct heritable forms—one pistillate, one staminate and two hermaphrodite (the continuous and the summer flowering). Sex reversal is well known and males and barren hermaphrodites can be made to produce fruit in response to seasonal change or decapitation.

Sex expression in the papaya is controlled by M_1 dominant factor for maleness, M_2 dominant factor for hermaphroditism, *m* recessive factor for femaleness. Selfed males produced males and females in the ratio 2 : 1 and selfed hermaphrodites—hermaphrodites and females also in the ratio 2 : 1. Thus the male and the hermaphrodites are heterozygous, the homozygous form being lethal. Females x males and females x hermaphrodites gave the back-cross 1 : 1 ratio. From the practical standpoint the crosses between females and hermaphrodites are most important as all the offspring are fruit-bearing. E. K. J.

313. Ubisch, G. von 634.651:577.8:575.11

Os sexos dos mamoeiros. (**Sexes in papaya**).

An. 1ª Reun. Sul-Amer. Bot. Rio de J. 1938 : **3** : 377–80.

From the seeds of a single fruit of a hermaphrodite plant 11 ♀ trees and 9 hermaphrodites were obtained, without any males at all. The author is not sure whether the mother plant was selfed or pollinated by another hermaphrodite, but she recommends the use of such hermaphrodites as a source of pollen, since it will lead to the elimination of all males.

314. Darrow, G. M. 634.715:575.12(73)

Blackberry growing.

Fmr's Bull. U.S. Dep. Agric. 1942 : No. 1399 : Pp. 18.

The origin and characteristics of 21 varieties grown extensively in U.S.A. are given. These also include hybrids between blackberry and dewberry. Hybrids of the blackberry and raspberry are omitted as they have not so far proved of much value in the country. E. K. J.

315. Gustafsson, Å. 634.715:576.16

The origin and properties of the European blackberry flora.

Hereditas, Lund 1942 : **28** : 249–77.

Apomixis in *Rubus*, as in *Poa* and other genera, is a recessive feature which reappears in the later progenies of most hybrids, although the immediate products of crossing are almost invariably sexual. This derived sexuality is a potent factor in the origin of new biotypes.

Meiosis is described in the diploid *R. tomentosus* Borkh., the triploid *R. nitidus* and various tetraploid and pentaploid species. It is concluded that the triploid species are autopolyploids, Moriferi veri weak auto- or even allopolyploids, and that *R. caesius* is a more or less strict allopolyploid; the tetraploid Rubi Corylifolii (hybrids between *R. caesius* and Moriferi veri) resemble the corresponding Moriferi though their univalent frequency is higher; pentaploid Moriferi veri display a rather high formation of multivalents but cannot be regarded as strict autopolyploids. Pentaploid Corylifolii, especially *R. Wahlbergii*, behave more or less as autopolyploids. Apomixis is neither restricted to the autopolyploid nor to the allopolyploid forms in the cytological sense, and is not confined to forms of hybrid origin. The triploids and pentaploids are regarded as representing a more primitive state; the tetraploid blackberries proceed progressively towards a state of panmixis.

The identification of herbarium specimens is sometimes possible merely from the pollen, the diploid, triploid and pentaploid forms having quite different pollen properties.

The mechanism of pseudogamy in *Rubus* seems to be analogous to that in *Poa*, depending on the capacity for autonomous development of the egg cell, while the necessity for fertilizing

the polar nuclei is retained. The various ways by which new biotypes can arise from pseudogamous *Rubus* forms are analysed; it is shown that even in apomicts with an entirely extinct sexuality new forms can arise by auto-segregation. This combination of apomixis with a capacity for variation largely accounts for the success of the blackberries in nature.

316. JOHNSTON, S. 634.73:575.11
Observations on the inheritance of horticulturally important characteristics in the highbush blueberry.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 352–56.
There is a tabulation showing percentage of crossbred seedlings of standard highbush *Vaccinium* varieties inheriting most desirable bush and fruit characters.

317. CAMP, W. H. 634.73:576.16(61)
Studies in the Ericales: a review of the North American *Gaylussacieae*; with remarks on the origin and migration of the group.
Bull. Torrey Bot. Cl. 1942 : **68** : 531–51.
An examination of the tribe *Gaylussacieae* of the *Vacciniaceae* to which the N. American huckleberries belong, showed that as a group it had undergone its major evolution in S. America before migrating to the North. The separation of the genus *Gaylussacia* into subgenera on a geographical basis would thus violate the fundamental phylogeny of the group. E. K. J.

318. CAMP, W. H. 634.73:576.356.6:576.16
Studies in the Ericales: a new name in blueberries.
Bull. Torrey Bot. Cl. 1942 : **63** : p. 240.
It has recently been demonstrated that the low-growing, glaucous, evergreen, eglandular blueberry of the Gulf Coast is a basic, archetype diploid, and that *Vaccinium myrsinites* with which it has long been associated as a variety is an allotetraploid derived only in part from this species. There are plants which seem to bridge the gap between the two, but this is attributed to the result of a peculiar type of genic saltation within the allotetraploid *V. myrsinites* population.
The blueberries are particularly promising breeding material and in honour of Dr Darrow of the U.S. Department of Agriculture the following new name is proposed for the above species, *Vaccinium darrowi*, Camp. nom. nov.

319. CHANDLER, F. B. 634.73:581.6
Blueberry storage.
Science 1942 : **95** : 603–04.
Studies made at the Maine Agricultural Experiment Station have shown that there is great variation in the keeping quality of the different clones of low-bush blueberries and varieties of high-bush blueberries (*Vaccinium* spp.). The low-bush showed the greatest variation, as some of the clones with poor flavour when put in storage had good flavour when the storage period was completed. With other clones the reverse was observed. Blueberries stored at 5° C. in an atmosphere with an oxygen content of 5% or slightly less were in the best condition at the end of the experiment.

320. CLARK, J. H. and GILBERT, S. G. 634.73:582:581.45
Selection of criterion leaves for the identification of blueberry varieties.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 347–51.
In this later paper (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 1102) the effect of variations in vigour on leaf characteristics is reported.

321. WILCOX, A. N. 634.75:575.125
Recent progress in strawberry breeding.
Minn. Hort. 1941 : **69** : p. 83.
A new, late variety of strawberry, Minnesota No. 1192, with distinctly superior flesh qualities was produced at the University of Minnesota Fruit Breeding Farm. It is the result of a new method of breeding strawberries. It consisted in inbreeding varieties for several generations,

for selection of pure lines with superior qualities and then using them as parents in crosses, to obtain the desired combination. Hybrid vigour was restored on crossing. This method is recommended as the most promising for strawberry improvement. E. K. J.

322. PHILOSOPHOVA, T. P. 634.75:575.127.2:581.162.5
Bridging species method in hybridization of the garden strawberry, *F. grandiflora*, with other *Fragaria* species.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 924–26.

In these experiments the hybrids *F. elatior* x *F. neglecta* and *F. elatior* x *F. vesca* were used as bridging species (mainly with the object of obtaining fertile progeny) in hybridization involving *F. grandiflora* (variety 16–129 obtained from Chudo Ketena x Rotshinskaya) which was pollinated separately with pollen from two seedlings each of these hybrids. All four seedlings in question had male flowers. A total of 1,313 seeds was obtained from which 141 seedlings were raised. As a control direct crosses of *F. grandiflora* x *F. elatior* and *F. grandiflora* x *F. neglecta* were made.

Of the 113 hybrid seedlings from the triple crosses the majority were intermediate in habit, leaf characters and other features. Only five were of the pure *F. grandiflora* type and they are presumed to be of parthenogenetic origin or the result of chance pollination by other strawberry plants.

The plants that ultimately set fruit comprised the following combinations: –Combination No. 66 *F. grandiflora* x F_1 (*F. elatior* x *F. neglecta*) seedling No. 19. The paternal parent had $2n = 28$ chromosomes. Out of 48 plants 25, which were of hybrid type, flowered and 14 of these were pistillate and 11 hermaphrodite. Seedling No. 66–11 was characterized by normal development of the fruits, which were elongated and regular in shape, bright red with white flesh, fragrant, succulent and sweet with a sour after-taste. The first fruit weighed 3·25 grm., subsequent ones less. Each fruit set 30% of seed from the total number of ovules.

Combination No. 69 seedling No. 36, from the same cross but with a chromosome number of $2n = 35$ in the pollen parent. Out of 32, 19 plants flowered, 8 having pistillate florets, 7 having florets intermediate between the hermaphrodite and staminate types, and 4 being asexual. Only one plant set fruits, which were abnormal as was also the case with those of Combination No. 67 from *F. grandiflora* x F_1 (*F. elatior* x *F. vesca*) seedling No. 25 in which the hybrid parent had $2n = 28$.

Combination No. 65 *F. grandiflora* x F_1 (*F. elatior* x *F. vesca*) seedling No. 13, in which the hybrid parent had $2n = 35$, produced 11 plants, 3 of which flowered, 2 having pistillate florets and one, staminate florets. All the plants were sterile.

An analysis of pollen from 19 plants showed a range of 37·8–90·1% of abortive pollen, a great number of plants having from 50–80%. The various combinations showed no appreciable difference in this respect.

From combination No. 66, 9 seedlings had $2n = 42$ chromosomes, in combination No. 69, 2 had $2n = 42$, and 2 others $2n = 44$ and 47 chromosomes respectively. In two seedlings of the *F. grandiflora* type the diploid chromosome number was 56.

A study of meiosis in seedling No. 66–41, which had hermaphrodite florets and set fruits weighing 3 grm. and a chromosome number of $2n = 42$, suggested that autosyndesis, though not absolutely complete, occurred between two sets of *F. grandiflora* chromosomes (7 each), between 2 sets of the *F. elatior* x *F. neglecta* hybrid chromosomes (7 each) and also between 2 other sets of chromosomes of the garden strawberry.

Both the control crosses gave sterile plants only.

323. CARTER, W. 634.774–2.7:576.16
The geographical distribution of mealybug wilt with notes on some other insect pests of pineapple.
J. Econ. Ent. 1942 : **35** : 10–15.

The data include distribution of *Pseudococcus brevipes* and green spotting effects on pineapple varieties in different localities of various countries. The insect has world wide distribution in tropical and subtropical latitudes but it is probable that many biological strains have arisen. Green spotting colonies have been found which did not show the typical symbiont picture of the green spotting strain in Hawaii. Strains of a single species characterized only by differences in the symbiont flora might arise as a result of mutation of the symbionts,

although this involves ascribing more significance to the function of the symbionts than would be expected if the relationship between symbiont and host was purely commensal. If, however, the experience with two Hawaiian strains can be used as a criterion, differences in the symbiont flora, which would indicate separate strains, will probably be associated with other differences.

VITICULTURE 634.8

324. Scherz, W. 634.835:575.242:576.356.5
Die Mutationen der Rebe, ihre Bedeutung und Auswertung für die Züchtung. **(The mutations of the vine, their importance and utilization for breeding).**
Wein u. Rebe 1940 : **22** (4) : 73–86. [From Biol. Abst. 1942 : **16** : Sect. A. Abst. 15781].

The literature on mutations in vine varieties is reviewed including some new mutants and a tetraploid Riesling in particular. Mutations affecting berry colour, seedlessness, shape and size, chromosome number and disease resistance, etc., are recorded and their possible value in breeding is considered. A programme for vine breeding in Germany, based on the use of mutations and small local variations, is outlined with special reference to disease resistance.

325. Makarevskaja, E. A. and Iluridze-Molchan, K. M. 634.835:577.15:576.16
Catalase in vine shoots.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **31** : 614–16.

In studying catalase activity in vine shoots the varieties of *Vitis vinifera* that are highly active include the scion varieties from Eastern Georgia, Saperavi and Rkatsiteli and the stock varieties 101–14 and 3309 which are hybrids of *Riparia* x *Rupestris*. On the other hand the hybrids obtained from crosses with Berlandieri 420A (Riparia x Berlandieri) and 41B (Chasselas x Berlandieri) are less active. Some relation would appear to exist between climate and the degree of catalase activity of a variety, but it is also suggested that the catalase index of varieties is liable to change under altered conditions of temperature. For example, though the West Georgia variety Tsitska (pure *Vitis vinifera*) shows a very stable low value, the American hybrids 420A and 3309 changed their indices in the hothouse after being kept at 8° C. In general, hybrids of American *Vitis* species may be expected to change their high index to a low one and *vice versa* according to the conditions under which they are kept.
It is pointed out that while the scions (*Vitis vinifera*) showed considerable activity at a high storage temperature (8° C.) the stocks (American) are very active at a lower temperature. This anomaly is to be explored.
The relevance of these and other findings to grafting technique is indicated.

326. Gollmick, F. 634.835:581.162.3:581.331.2:578.08
Über die Lebensdauer des Rebenpollens. **(Length of life in vine pollen).**
Angew. Bot. 1942 : **24** : 221–32.

In work at Naumburg it was found that vine pollen would keep best in an atmosphere showing 40–50% moisture. It was found possible to keep pollen viable by storing at 1° C. and at this humidity until the following time of blossoming. Pollination experiments with pollen so stored were successful and resulted in seed from which in a few cases (4 out of 89 originally pollinated) apparently normal plants were derived. A new method of storing vine pollen for breeding work is suggested.

327. Olmo, H. P. 634.835:581.48:582
The use of seed characters in the identification of grape varieties.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 305–09.

The mature seed, as judged by weight, length and width measurements is more constant than other fruit characters commonly used in variety description. Although the seed length may increase appreciably with increase in berry size, width remains practically constant under the two environmental conditions studied. Morphological features of the seed of value in descriptive work, and not mentioned or used by previous workers, are described.

328. Vasconcellos, J. de Carvalho e, Santa Barbara L. and Baptista, A. 634.835:582
Castas de videira. Seu estudo botanico. (**Varieties of vine. Their botanical study**).
Rev. Agron., Lisboa 1941:**29**:177–227, 353–403, 486–523; 1942:**20**:91–141.
In continuation of earlier studies (cf. "Plant Breeding Abstracts", Vol. IX, Abst. 1211) a further description is given of features found useful in classifying varieties of vine, taking into account characters of the plant, fruit and seed. There follows a dichotomous key for the identification of 100 varieties, which are fully described and illustrated.

329. Gray, G. F. 634.835–2.111–1.521.6(76.6)
Resistance of grape varieties to the freeze of November, 1940.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 329–31.
Differences in resistance to early autumn frost injury are due to varietal characteristics. Tables record recovery of numerous varieties from the November frost and the relation of location and yield to hardiness.

FORESTRY 634.9

330. 634.97:575(48.5)
Johnsson, H. 634.972.5:575(48.5)
Växtförädling av björk—mål och medel. (**Improvement of birch—objects and means**).
Svensk PappTidn. 1940 : **43** : 450–56; **44** : 4–7, 20–22.
The nature of variation in forest trees and its causes and importance in breeding for improvement are explained with particular reference to the birch in Sweden. In briefly reviewing the distribution of birch stands the species represented in that country and various systematic studies by different investigators, the work of Gunnarsson and of others on intermediate forms between species, fertile hybrids and the underlying cytological basis of pure or of hybrid types as revealed by their chromosome number are discussed. According to both Regel and Gunnarsson the pure species of birch concerned (with $2n = 28$ or 56) are relatively rare, the majority of specimens being "hybridogenous" intermediate forms (with chromosome numbers ranging between 28 and 56). The vitality of aneuploid forms (in the aspen in particular) has been regarded as inferior to that of euploids.
To ascertain the frequency of aneuploids among birch trees in nature the diploid chromosome number was determined in seedlings from 15 mother trees of different morphological types—some pure species, others intermediate forms. Only 4 seedlings out of 534 had an intermediate chromosome number and these had the typical F_1 chromosome number $2n = 42$. Possible reasons for this uniformity in the various stands are considered. The plants from the $2n = 56$ chromosome plants had the pubescence characteristic of the *B. pubescens* and the 28 chromosome families showed the short warty branches of *B. verrucosa*.
Pollen from hybrids between species with different chromosome numbers is usually more or less defective, though it has been stated to be remarkably uniform in appearance while quite distinct from pollen of the pure species. Examination of birch pollen should therefore give an indication of hybridity.
Such tests were successfully used to supplement (and confirm) the chromosome number determinations for the 15 mother trees.
The results suggest that hybrids between *B. pubescens* and *B. verrucosa* occur much too rarely (incidence not over 1%) to contribute to the great variation found in the birch and their frequency is too low to have any definite effect in practical forestry. The Swedish birch would therefore appear to exhibit two different and well defined "spheres of variation" (corresponding to the two species in question), *B. pubescens* showing much more pronounced variation in accordance with its double number of chromosomes as compared with *B. verrucosa*.
The same range of variation may be assumed to prevail in regard to features of practical value; and—like the variation in systematic characters—variation affecting economic characteristics is in the main heritable.
The aims of the breeder in utilizing the wealth of variation in Swedish birch stands should be

the selection of (1) rapidly growing species of both *B. alba* and *B. verrucosa* for various regions; (2) disease resistant types with special reference to damage from rot. According to Sylvén (1940) a few seedlings out of 1,000 representing 100 different families in the nursery of the Association appeared highly resistant to rust. Different families varied greatly in their resistance as a whole and rust resistant strains should be another objective in breeding.
The interaction between qualitative and quantitative characters in affecting yield, etc., is pointed out as well as the importance of strictly qualitative characteristics affecting the commercial value of the timber, e.g. stem structure which is connected with the production of well formed types with straight trunks and fine branches. Chemical composition of the timber may also become a feature of economic significance in the use of birch as raw material in mass industries.
Superior lines with certain special birch qualities should be grown and, as these qualities probably occur in both *B. verrucosa* and *B. pubescens* (Muhle Larsen 1940), a parallel process of selection should be carried out with both these species to obtain 28 and 56 chromosome races with corresponding qualities. Furthermore, starting with different local races several different types with corresponding characteristics should be evolved within each species with special reference to adaptations to different latitudes. The differences in the photoperiodic reaction in pines and aspens which underlies their climatic adaptation may probably play a similar role in the birch, though in this genus the racial distinctions in photoperiod are not so extreme.
Birch improvement necessitates a study of the biology of flowering, which is briefly explained with reference to self- and cross-pollination and inbreeding effects.
The different ways in which selection applied to forest trees may be practised are illustrated by an imaginary example of the practical procedure in the case of a beech stand showing environmental and genotypic variation in a character such as height increase (per year), assumed to be conditioned by 2 genes.
The methods used in mass selection and in the selection of families from individual mother trees, applied to birch tree improvement are exemplified in detail with tables showing their supposed genetic constitution and the merits of the two procedures are critically discussed.
The second method has been applied on a considerable scale by the Association in birch improvement in stands containing *B. verrucosa* and *B. pubescens*; and 500 mother trees have been selected from which families are being raised for ultimate testing of their economically valuable characteristics in comparative trials. In describing the method of conducting comparative "field trials" with trees (in contrast to crop plants) the difficulties due to the large area required and the necessity of including an adequate number of trees to ensure statistically reliable results are explained. The Association has planned their experiment with 150 birch trees to represent each family in each trial, each 150 being planted in 3 groups of 50 in each "plot". Other difficulties are also considered and 50 individuals is regarded as the minimum per "plot" for heterozygotes.
The results which may be obtained by such comparative trials are outlined and their relation to advances in practical forestry examined.
The article [which is to be continued in a subsequent issue of the journal] here concludes with an outline of the technique of selection and vegetative reproduction in Swedish birch stands.

331. PETER-CONTESSE, J. 634.97:575.42
Hérédité et sélection. (**Heredity and selection**).
J. For. Suisse 1941 : **92** : 121–26.
The example is cited of a tall upright beech which gave large erect seedlings as opposed to a poor tree that gave excessively branched seedlings without a proper trunk. However carefully such seedlings are tended they will produce inferior trees. Careful selection and the establishment of an improved race is thought to be just as important as suitable cultural measures.

332. 634.97–1.524(8)
Tropical forest research.
J. For. 1942 : **40** : 169–72.
There are about 600 native and exotic species in Puerto Rico, an island only 100 miles long and 35 miles wide. A similar abundance is found in all the tropical rain forest areas of South America and the author discusses the possibilities of utilizing these vast resources.

333. Sylvén, N. 634.972:575(48.5)
Föreningen för växtförädling av skogsträd. Styrelseberättelse för år 1939.
(Association for Forest Tree Breeding—Board's report for 1939).
Svensk PappTidn 1940 : **43** : 106–07.

Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet under år 1939. **(Annual Report on the work of the Association for Forest Tree Breeding during the year 1939).**
Ibid 1940 : **43** : 130–35, 153–58.

In 1939 the main institute of the Association at Ekebo was made ready for use. A chromosome laboratory and other up-to-date research laboratories including the low temperature laboratory are also now available for work on plant improvement. The amount of land for experiment plots and nurseries has been extended and some interesting species and forms of the European silver fir, *Betula* and *Sorbus* have been planted. Financial support has been received from the Standing Commission for Plant Improvement and other bodies.
The Annual Report retails the following:—
As a result of the improved facilities it has also been possible to develop the work of the substations and their contribution to the improvement of local types.
Arrangements were made to co-operate with the State Forestry Research Institute and other bodies concerned with forest tree improvement.
A useful classification of pine tree seed was worked out in connexion with artificial pollinations and with the regional survey of élite and other types of pine stands in various districts of Sweden. Selections of mother trees with different types of crown were also made among Swedish grown pines and also European and Siberian larches and a few beech stands.
Some aspens from crosses made by the Association in 1938 were planted out at Hällnäs in Västerbotten. Some crosses of Belgian x Swedish aspens (which are being tested in Belgium) are regarded as of special interest. Intimate contact has also been established between the Ekebo Institute and the Swedish Seed Association and the Lund University Institute for Genetic Research and several other educational and research centres concerned with plant improvement. Furthermore, Dr. Holger Jensen of the Ramlösa Nurseries (to whom the raising of scions from aspen hybrids and apple tree crosses made at Svalöf has been entrusted) is also to obtain scions from some of the Association's aspens for an arboretum which is to be established at Ekebo for specimens of the most important parent trees of aspens and other deciduous trees used there in hybridization work. In collaboration with the cellulose industry valuable results for future breeding operations with conifers were obtained bearing on the commercial value of the "kamgran" type of spruce and the utilization of spills from the living tree as a test for yield of cellulose, etc. (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 1203). This work was developed further by comparative laboratory tests of selected spruces of the "kamgran" type.
Material from selected mother trees of various types is being raised at a number of centres; surveys of pine trees were made in various districts and mother trees for seed collection were chosen. More extensive investigations were also made on the correlation in the spruce between type of branching and valuable forest characteristics.
In the research on deciduous trees the geographical survey of the aspen was completed, special note being taken of reports of specimens with exceptionally large leaves or otherwise outstanding trees. Preliminary trials of aspens have been begun at Ekebo and in many other localities. More of the aspen types already obtained with high chromosome numbers are being grown for ultimate testing in comparative trials under forest conditions.
During 1939 research was continued along previous lines—(1) hybridization and selection followed by forest trials of the different hybrids and their productivity under varied local conditions and (2) investigations on the influence of the chromosome constitution upon the commercial merits of the tree. Special attention was paid to the question of the occurrence of long- and short-day aspens (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 1203).
Preliminary experiments on the technique of the vegetative multiplication of aspens were carried out at the Ramlösa nurseries. At Ekebo too interspecific poplar crosses were made for the study and selection of the hybrids and for their improvement by chromosome duplication, etc. The progeny were due for testing in 1940. Triploids and tetraploids have been obtained and in one hybrid from a giant x giant type cross about 99 chromosomes were found.

The use of the colchicine method has also been studied and successfully used to obtain tetraploid aspens of various hybrid types (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 212). An experiment on the germination of aspen seed after storage in a dry atmosphere showed that even after about two months the germination percentage was from 75–100, while after four months it had fallen to 22%.

The selection work and botanical studies on birches started in 1939 has been developed and comparative trials are contemplated. Considerable variation in the vigour of the seedlings from birch seed, even when obtained from a single mother tree, has been recorded and preliminary experiments are planned to determine whether this variation is genetically conditioned.

In field work on birch in Skåne, Ekebo, and other districts numerous mother trees were closely studied and parallel investigations of mother trees and their progeny were begun, cytological material being also taken from the mother trees. Problems of special interest are the chromosome number of different types of birch (including the white birch and the common birch) and the frequency of intermediate hybrid forms of both species as well as their cytological features and characteristics of practical value. A comparative trial of the two birch types was begun in the north of Östergötland.

As a contribution to the analysis of the species composing Swedish birch stands, a cytological examination of 20 representative progeny from selected mother trees has been made and the results will soon be published.

The relatively low germination of birch is being investigated from the standpoint of its possible relations with botanical type or chromosome number.

Colchicine treatment has also been used to increase the chromosome in birches and single specimens of both the common and the white birch with reduplicated chromosome number have been obtained.

Artificial birch crosses have been made on a relatively large scale using cut branches in the artificially illuminated greenhouses at Ekebo, and though the technique has not yet been perfected the results have been useful for the breeding work in progress.

Preliminary experiments on grafting have also been made with the common birch.

Seedlings are now being raised at Ekebo and at the sub-station at Linköping from acorns collected in 1938 from selected mother-trees of oak. A survey of oak stands has also been undertaken in various regions together with the collection of acorns from a number of mother trees.

Colchicine experiments have been tried with oaks, in conjunction with germination tests and some success is recorded.

A similar survey of beech stands in Skåne is being made for the first time and 129 seedlings are being raised at numerous centres.

Elm seedlings too have been raised by the same methods as those used for the aspen in the Ekebo greenhouse with artificial lighting. The initial crosses have shown that self- and cross-sterility are common and further research on the plant is needed.

Professor Turesson's N. American collection of seed of foreign deciduous trees, sown at Ekebo, has on the whole produced some very good seedlings.

The chromosome laboratory has conducted chromosome studies of aspen, birch, pine and spruce and investigations of the reduction division in various kinds of trees in connexion with the colchicine treatment technique: the results will be published in the Association's proceedings.

The present report also gives information on the library facilities of the Association, the work of the sub-stations and the publications, lectures and tours organized during 1939.

334. Sylvén, N. 634.972–2.111–1.521.6(48.5)
Insänd uppgifter om det senaste vinterhalvårets frostskador å svenskodlade träd och buskar! (**Information received about frost injuries to trees and bushes grown in Sweden during the winter-half of last year**).
Svensk PappTidn. 1940 : **43** : 281–85.

Includes extensive tabulated records of the frost resistant individuals of various species of forest trees and ornamentals of economic importance.

335. MULLER, C. H. 634.972.1:575.12:576.16
Hybridism, ecotypes, and peripheral race variants in *Quercus*.
Amer. J. Bot. Suppl. 1941 : **28** : p. 17s. (Abst.).
"Those individuals of a species which differ from the typical form of the species are often the basis of claims for hybridism in *Quercus*. The causes of this variation from the type may be sporting, stump sprouting, ecological stress, or the phenomenon of races about the periphery of a species' range. The latter, if isolated and distinct, may be the basis of valid species differentiation, but all these factors serve to multiply the number of claims for F_1 hybridity far beyond the number of actual hybrids existing in the wild. Heterozygosity resulting from ancient crosses also contributes to the claims for hybridism, but such a population, unless protected from dilution by back-crossing, exhibits merely the intra-specific variation common to so many of the species of *Quercus*".—Author's summary.

336. FLORY, W. S. (jun.) and
BRISON, F. R. 634.972.1:575.127.2
Propagation of the Ness hybrid oaks.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : p. 590.
F_1 hybrids of *Quercus virginiana* x *Q. lyrata* have the desirable combination of good size, regular form, semi-evergreenness (in Texas) and comparatively rapid growth rate. They have not been previously propagated, and the present work has been carried out with the object of increasing the hybrids for distribution. Propagation by grafting has been successful.

337. PALMER, E. J. 634.972.1:575.127.2
The red oak complex in the United States.
Amer. Midl. Nat. 1942 : **27** : 732–40.
Five species and several varieties of red oaks (*Coccineae*) are considered. Natural hybrids have been found between most of the *Quercus* species noted and it is probable that all are interfertile. The characters and distribution of the species are recorded.

338. JOHNSSON, H. 634.972.3
Cytological studies of triploid progenies of *Populus tremula*.
Hereditas, Lund 1942 : **28** : 306–12.
The chromosome numbers have now been determined in 1,665 F_1 diploid x triploid hybrids (cf. "Plant Breeding Abstracts", Vol. XI, Abst. 212) and in 308 individuals from 4 crosses of triploid x triploid. Practically all theoretically possible chromosome numbers occurred in the hybrids, though there was an excess of individuals with the diploid number. The viability of both aneuploid gametes and embryos seems to be peculiar to the aspen and may be associated with secondary polyploidy. The aneuploid individuals are however low in vitality, particularly those with chromosome numbers above 57. Among the euploids, the triploids grew faster than the diploids, whereas the tetraploids were inferior. Triploidy thus seems to be the optimum degree of polyploidy and tetraploidy the limit of viability.

339. SWINGLE, R. U. 634.972.8–2.8–1.521.6
Phloem necrosis—a virus disease of the American elm.
Circ. U.S. Dep. Agric. 1942 : No. 640 : Pp. 8.
On the basis of present information, the development of disease resistant elms by breeding and selection seems to be the most promising method of controlling phloem necrosis.

340. MINCKLER, L. S. 634.975:575
One-parent heredity tests with loblolly pine.
J. For. 1942 : **40** : 505–06.
Progeny tests have revealed appreciable differences in early growth between the progeny of different mother trees. Thus in 1934 seed was collected from 200 trees from 33 different stands and observations were made on the progenies during the first six years of growth. There was no correlation between the juvenile height growth or survival of progenies and any observable character of the adult mother trees but there were highly significant differences in both growth and survival of progenies of different mother trees. Thus the mean growth of the best progeny was 8·4 feet and of the poorest 5·4 feet in four years, the mean survival of the best progeny 96% and of the worst 53%. The ten best progenies grew 36% more in four years than the ten poorest.

341. Allen, G. S. 634.975:581.163
Parthenocarpy, parthenogenesis, and self-sterility of Douglas fir.
J. For. 1942 : **40** : 642–44.

Unpollinated cones produced a number of seeds without embryos (parthenocarpy). Self-sterility was shown to be high and adequate cross-pollination measures are necessary to procure viable seed.

There are indications that parthenogenesis may occur to a limited extent.

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342. Eastman, M. G. 635:575(74.2)
Agricultural research in New Hampshire.
Rep. Dir. N.H. Agric. Exp. Sta. 1940 (1941) : Bull. 330 : Pp. 42.

Plant breeding studies are reported by A. F. Yeager and J. R. Hepler. A cross between *Lycopersicon esculentum* and *L. peruvianum* has been carried through 3 generations of selfed material and 2 generations back-crossed to standard varieties. Partial recovery in size and quality has been obtained, but the extent to which the selections are disease resistant needs further study.

From work on crosses between ordinary musk-melon and a perfect-flowered Asiatic musk-melon (U.S.D.A.—236B) it is hoped to obtain high quality, early, disease-resistant musk-melons.

Bean selection from the 3rd generation of a cross between Gage and French Horticulture has produced three strains which are fairly early and have good pod length, while the colour of both the pod and shelled bean is good.

343. Mündler, M. and
Schwanitz, F. 635.15:576.356.5
Über einen Ertrags- und Düngungsversuch mit diploidem und autotetraploidem Münchener Bierrettich (*Raphanus sativus* var. *major* [L.] A. Voss). [**A yield and manurial experiment with diploid and autotetraploid plants of the Munich beer radish (*R. sativus* var. *major* [L.] A. Voss)**].
Züchter 1942 : **14** : 137–40.

Populations of colchicine tetraploids when grown apart sometimes produced a large number of diploids amongst their progeny, while in other cases only tetraploid progeny was obtained. Tetraploid and diploid populations were compared under three different intensities of manuring; in no case were differences of statistical significance observed and since the tetraploids were less fertile than the diploids they are regarded as horticulturally inferior.

344. Randall, T. E. and 635.31:576.356.4:576.356.5
Rick, C. M. 635.31:581.481:575
Preliminary cyto-genetic studies on polyembryony in *Asparagus officinalis* L.
Amer. J. Bot. Suppl. 1941 : **28** : p. 5s. Abst.

"Seed of *A. officinalis* L. from different sources, including controlled and open pollinations, was germinated and all multipled seedlings selected for further study. The frequency of multiple seedlings varied from 0·13% to 3·5% per female plant, the general mean being 0·95%. Twin seedlings comprised 97% of the 405 multiple seedlings obtained, the remainder being triplet seedlings. Members of a pair or triplet were attached in 41% of the total. This attachment varied in extent and in parts involved although it usually occurred in the primary root. In more than two-thirds of the cases attempted, twin seedlings so attached at the time of germination could be separated without injury in later development, thus demonstrating their dual nature. Chromosome counts indicated that 93% of the plants of twin origin were diploid, the remainder, haploid, triploid, tetraploid, and trisomic. Seedlings of deviating chromosome number were always associated with diploids or with seedlings of the same deviating chromosome number. If members of a pair differed in their chromosome number, the heteroploid member tended to be weaker, although it occasionally exceeded the diploid

* See also Absts 79 and 82.

member in growth. Where separation of attached seedlings was effected, both members had the same number. As far as the investigation has proceeded, in progenies showing segregation for genetic characters, all twins and triplets have been identical".—Authors' summary.

345. TODHUNTER, E. N. 635.48:577.16
The ascorbic acid (vitamin C) content of rhubarb.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 437–40.

"The ascorbic acid content of fresh rhubarb grown in the hothouse ranged from 3·5 to 5·8 milligrams per 100 grams for the Victoria variety and from 5·8 to 6·7 milligrams for the Wine variety. The field-grown product contained from 6·8 to 8·0 milligrams for the Victoria variety and from 6·5 to 16·7 milligrams per 100 grams for the Wine variety".

346. WHITAKER, T. W. and
THOMPSON, R. C. 635.52:575.127.2:576.356
Cytological studies in *Lactuca*.
Bull. Torrey Bot. Cl. 1942 : **68** : 388–94.

Observations on meiosis in 9 interspecific hybrids in *Lactuca* are reported: 3 between species with 9 pairs of chromosomes, 4 between species having 9 and 17 pairs of chromosomes, and 2 between species with 17 chromosomes.

Of the hybrids between the 9 chromosome species, meiosis was regular and 9 bivalents regularly formed in *L. Raddeana* x *L. indica* while *L. tatarica* x *L. indica* and *L. sativa* x *L. virosa* showed cytological irregularities and consequent sterility. On the basis of genetic evidence the 9 chromosome species of *Lactuca* are thus found to fall into 2 compatibility groups. Twenty-six somatic chromosomes were counted in crosses between the 17-chromosome amphidiploid *L. graminifolia* and *L. virosa* ($x = 9$). These formed 9 bivalents and 8 univalents at meiosis. When however *L. graminifolia* was crossed with *L. indica* there was a reduction in the number of bivalents formed. *L. tatarica* ($x = 9$) x *L. floridiana* ($x = 17$) had also 26 somatic chromosomes. The number of bivalents formed at meiosis ranged from 9–11 and occasional trivalents were also observed.

The 2 F_1 hybrids between amphidiploid species *L. graminifolia* x *L. floridana* and *L. canadensis* x *L. floridana* had 17 pairs of chromosomes. The hybrids were only slightly less fertile than the parents. The 17 chromosome American group of species was thus found to be very homogeneous and it is suggested that this group must have descended from a single amphidiploid. E. K. J.

347. 635.52:575.127.2:576.356.5
THOMPSON, R. C. 635.52:575.129
An amphidiploid *Lactuca* produced through non-reduction in F_1 hybrids.
J. Hered. 1942 : **33** : 253–64.

The genetic relationships among species of *Lactuca* have been reported in earlier studies (cf. "Plant Breeding Abstracts", Vol. XII, Abst. 606). Crosses between species with $n = 9$ and $n = 17$ chromosomes had $2n = 26$ chromosomes and were generally sterile. Two of 16 such crosses were however partially fertile. The morphology and cytology of one of these, *Lactuca spicata* ($n = 17$) x *L. indica* ($n = 9$), hybrids is described. A uniform generation of 127 plants with chromosome number $2n = 52$ was obtained from this cross. These were attributed to the fertilization of unreduced gametes observed in the F_1. E. K. J.

348. POOLE, C. F. 635.61/3:575.11
Genetics of cultivated cucurbits.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : p. 386. (Abst.).

This is an abstract only of a review to be published in full in Botanical Reviews.

349. WOLF, E. A. and
HARTMAN, J. D. 635.61:575:578.08
Plant- and fruit-pruning as a means of increasing fruit set in muskmelon breeding.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 415–20.

Any improvement in breeding technique which can materially increase the percentage of fruit set is of value to the breeder.

The pruning experiments were made on the New Seed Breeders strain of the Hale's Best variety. The experiment in which the plants were completely pruned gave the best results.

350. Munger, H. M. 635.61:575.125
The possible utilization of first generation muskmelon hybrids and an improved method of hybridization.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 405–10.

"In the course of a musk-melon breeding program conducted by the Department of Plant Breeding of Cornell University for the purpose of obtaining a fusarium resistant variety satisfactory for New York State, the question as to the possibility of growing first generation hybrids commercially was raised by several melon growers. This was occasioned by an F_1 hybrid of Honey Rock and Plant Breeding No. 13. The latter is a fusarium resistant variety selected from material generously supplied by Professor T. M. Currence of the University of Minnesota and similar to Golden Gopher. The hybrid is fusarium resistant, of excellent appearance and quality, and apparently very productive. Although the fruit is rather small for present market preference, the hybrid appealed to several growers who saw it, and they inquired as to the possibility of producing it".

Subsequent investigation has been concerned with the economic production of hybrid seed and the question whether it has real advantages over open-pollinated varieties. The commercial utilization of good hybrids appears possible when plants are started under glass and only a small amount of seed per acre is needed. Where disease resistance is dominant, hybrids may be useful in making acceptable disease resistant types available commercially before such types can be made relatively true-breeding by selection in the progenies of the hybrids. It is considered possible that the cost of hybrid seed may be reduced by developing monoecious strains to serve as the female parent.

351. Scott, F. M. 635.62:576.312
Nuclear size, in *Echinocystis* and in *Cucurbita*.
Amer. J. Bot. Suppl. 1941 : **28** : p. 6s. Abst.

"Nuclei in the apical meristem of *Echinocystis macrocarpa* measure from 2·5 to 3 microns in diameter, and from 49 to 91 cubic microns in volume. The nuclei of the cambium are somewhat larger. In the developing vessels (maximum diameter 240 microns) the largest nuclei increase 3,600 times in size and measure in diameter and in volume 70 microns and 180,000 cubic microns respectively. The parenchyma cells are large, but the nuclei do not exceed 43 microns in diameter and 56,000 cubic microns in volume. In *Cucurbita Pepo* maximum diameters and volumes are somewhat less than in *Echinocystis*".—Author's summary.

352. Hartmair, V. 635.63:576.312.35
Cytologische Untersuchungen an asiatischen Formen von *Cucumis sativus* L.
(Cytological investigations on Asiatic forms of *C. sativus* L.).
Züchter 1942 : **14** : 132–36.

Modifications of the iron-acetocarmine and the iron-haematoxylin methods used in these investigations are described. Meiosis was studied in 22 cucumber varieties, in all of which $x = 7$ and $2n = 24$.

353. Shifriss, O. 635.63:576.356.5:581.04
Polyploids in the genus *Cucumis*. Preliminary account.
J. Hered. 1942 : **33** : 144–52.

Tetraploids of 4 varieties of the cultivated cucumber, *C. sativus* ($2n = 14$), were obtained by treatment of shoot apex at the cotyledon stage with 0·3 to 0·5% colchicine emulsion.

These had 28 chromosomes and exhibited the usual gigantism observed in tetraploids. They were partially sterile.

Succeeding selfed generations produced maternal diploids as well as a large number of mutants and segregates for plant vigour, size and colour of fruits. Intercrosses between diploids and tetraploids were difficult to obtain.

One spontaneous tetraploid similar to those produced by colchicine was found in a field of 2,500 diploid seedlings. E. K. J.

354. Jenkins, J. M. (jun.) 635.63:581.162.32
Natural self-pollination in cucumbers.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 411–12.
About 30 to 35% of natural self-pollination occurs in cucumbers under field conditions. This probably varies to some extent with weather and soil conditions and with different varieties as these are factors which affect the ratio of staminate to pistillate flowers.

355. Bindloss, E. A. 635.64:575–181.13
A developmental analysis of cell length as related to stem length.
Amer. J. Bot. 1942 : **29** : 179–88.
The analysis was made in the apical meristematic regions of genetically tall and dwarf races of *Lycopersicon esculentum* and *Zinnia elegans*. While there is no constant relationship of cell length to stem length during vegetative ontogeny there is, however, a fundamental and genetically controlled sequence of changing size relations in the terminal meristems which is ultimately related to differences in cell number and thus to differences in plant height.

356. Barrons, K. C. and
Lucas, H. E. 635.64:575.125
The production of first-generation hybrid tomato seed for commercial planting.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 395–404.
A technique has been developed for producing hybrid tomato seed on an extensive scale. The procedure is described. It is stressed that questions of time of pollination in relation to time of emasculation, the number of pollinations that are profitable, and the best time of day in which to carry out the work should be studied in greater detail under climatic conditions especially favourable for the setting of fruit.

357. Lyon, C. B.,
Beeson, K. C. and
Barrentine, M. 635.64:575.14:631.8
Macro-element nutrition of the tomato plant as correlated with fruitfulness and occurence of blossom-end rot.
Bot. Gaz. 1942 : **103** : 651–67.
"A population of 1,044 plants of an inbred strain of Bonny Best tomatoes was grown in sand culture. The effects of 87 different nutrient solutions varying in the relative proportions of macro-nutrient elements were studied in relation to fruitfulness and the occurrence of blossom-end rot. The data were reduced and analysed by statistical methods".

358. Kerkis, J. J. and
Pigulevskaya, N. N. 635.64:575.257:581.6
Interaction between *Lycopersicum esculentum* and *Datura stramonium* in the case of grafting.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 505–08.
In a series of investigations of the morphogenetic interaction between stock and scion 24 grafts were made with *L. esculentum* and *D. stramonium* as stock and scion, the object being to study the biochemical and morphological modifications of the tomato fruit when grown on thorn-apple. The results of analysis of the components of the grafts and in one case, of the first seed generation, for the presence of atropine (an alkaloid of the thorn-apple) are presented here, together with a morphological study of tomato fruits obtained from a graft of the variety Ficaracci grafted on the *Datura* species.
The technique of grafting, in which the age relations of the components were varied, is described, as well as the methods used for detecting the presence of atropine and for measuring the fruits.
No connexion was found between the atropine content of the tomatoes and the relative ages of the components of the grafts.
Atropine was found in all the grafts but in varying amounts in their different regions and in the smallest quantity in the tomato fruits.
Possible explanations of the results are considered with brief observations on their possible relevance to the effect of chemical changes in a plant upon its capacity for crossing with other

species, its resistance to disease, climatic conditions and parasites and upon increased frequency of mutation in cell structures responsible for the reproduction of hereditary characters in the progeny.
Tomato plants grafted on thorn-apple contained only insignificant amounts of atropine in their fruits. Thorn-apples grown on tomato stocks always contained atropine.
No atropine was found in the progeny grown from seed from plants that had received their atropine through grafting.
In shape the tomato fruits obtained on thorn-apple stocks were indistinguishable from normal fruits.

359. Stair, E. C. and
Showalter, R. K. 635.64:576.356.5:581.04
Tetraploidy in tomatoes induced by the use of colchicine.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 383–86.
Three methods of treatment were used: (1) immersion of the tips of young vigorously growing tomato plants in vials of colchicine solution for various periods of time; (2) soaking seeds in different concentrations of colchicine in aqueous solution for varying periods of time; and (3) dropping a 0·4% solution of colchicine on the growing tip of the plant. The technique may be of value in a tomato breeding programme for the purpose of crossing some rather distantly related species.

360. 635.64:581.162.32
Nicolaisen, N. 635.652:581.162.32
Fremdbefruchtung bei den Kultur-tomaten und Stangenbohnen. (**Cross-pollination in cultivated tomatoes and runner beans**).
Forschungsdienst 1942 : **13** : 124–29.
By sowing several tomato varieties in adjacent rows a number of hybrids were obtained in the progeny; a distance of 50 m. is regarded as sufficient to prevent out-pollination. Indications are given of varieties which, owing to their morphological similarity, it is safe to grow side by side.
Similar observations with runner and dwarf beans showed the distance necessary for isolation to be 300 m.

361. Gustafson, F. G. 635.64:581.163:575.17
B-naphthoxyacetic acid as an inductor of parthenocarpy in tomatoes.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 387–89.
"Seedless fruits produced with B-naphthoxyacetic acid were larger than seeded fruits produced by pollination. Setting was also somewhat greater than with open pollination".

362. Hawthorn, L. R. 635.64:581.47:575
Breeding summer tomatoes for increased size.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 390–94.
Following an earlier publication (cf. "Plant Breeding Abstracts", Vol. VIII, Abst. 1651) work has been in progress with Bison x Summerset crosses. No new or longer fruited summer variety has yet been released from the cross, but it is considered this will be produced in time.

363. Yatzynina, K. N. 635.64–2.3–1.521.6:575.127.2
Breeding for tomato variety resistant to bacterial canker *Aplanobacter michiganense* E. F. Smith.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1941 : **32** : 372–73.
Hybrids which had been undergoing selection for an early type suitable for canning and were derived from crosses of cultivated varieties on the currant-tomato (*Lycopersicon pimpinellifolium*), were inoculated in the hot-bed with *Aplanobacter michiganense*. Out of 1,728 inoculated plants 25 were selected showing no external signs of disease or internal browning of the stem. Among these were some resembling the varieties Lucullus or Danish Export in habit and some resembling currant tomato. The discussion is here confined to the former type. After inoculation the following year the cultivated control varieties were markedly affected by disease but the progeny of the group of hybrids in question again showed great resistance though all also showed signs of disease. Three types of hybrids survived entirely and remained

green until the end of the vegetative period. They bore many fruits and gave a fair yield. Four other kinds showed depressed growth and many plants died, but some proved resistant, grew well and gave a high yield: in their case segregation appeared to have taken place. The best types of hybrids closely resembled Lucullus (No. 1) and Danish Export (Nos. 9 and 22).

Similar tests conducted at another centre and involving in addition 146 kinds of cultivated varieties and hybrids revealed no resistant plants and any survivors showed depressed growth and gave no yields.

Among the species *L. cerasiforme* Dün, *L. pyriforme* Dün, *L. pimpinellifolium*, *L. esculentum* var. *suscentureatum* Pasgu. which were also tested, *L. pimpinellifolium* alone showed resistance, and in a marked degree.

364. Romshe, F. A. 635.64–2.6–1.521.6:575.127.2
Nematode resistance test of tomatoes.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : p. 423.

Field trials of tomatoes to determine if any species or varieties are resistant to *Heterodera marioni* are recorded. The use of *Lycopersicon peruvianum* as breeding stock to develop commercial varieties resistant to the nematode appears possible. It is understood that several workers have obtained crosses of this species with *L. esculentum*.

365. Stroman, G. N. 635.652:575(78.9)
Results of 1941 bean strain tests at Deming and Estancia, New Mexico.
Pr. Bull. N. Mex. Agric. Exp. Sta. 1941 : No. 934 : Pp. 2. (Mimeographed).

"The New Mexico Agricultural Experiment Station is conducting a rather extensive project on the improvement, by breeding, of the New Mexico pinto bean. The program includes a progeny test, increase blocks, and preliminary strain tests at Deming and Clayton, New Mexico, and advanced strain tests conducted at Deming, Estancia, Das Vegas, Mosquero, Capulin, and Clayton. The advanced strain test at each of these places consists usually of 12 strains, but only 2 or 3 of the same strains are used at any two places.

It is the purpose of this report to give the results of the advanced bean strain test at Deming and Estancia".

366. Staten, H. W. 635.652:575.42(76.6)
Mung beans for Oklahoma.
Circ. Okla Agric. Exp. Sta. 1942 : No. C–104 : Pp .7.

Two varieties of the mung bean, *Phaseolus aureus*, the green and the golden are being grown extensively in Oklahoma for food and forage. Many selections from the green type include dull coloured beans called "native" and the shiny hard textured known as the "oriental".

E. K. J.

367. Boswell, V. R. 635.652–2–1.521.6
Growing field beans in humid areas.
Leafl. U.S. Dep. Agric. 1942 : No. 223 : Pp. 8.

"There are no varieties of beans resistant to the root rots and wilt. Under average conditions, however, Robust and Michelite are resistant to mosaic and only moderately susceptible to anthracnose and bacterial blights. Red Kidney, White Imperial, and Perry Marrow are moderately resistant to anthracnose, and Red Kidney and Perry Marrow are also less susceptible to bacterial blights than most varieties".

368. Hähne, H. 635.652–2.3–1.521.6
Beiträge zur Frage der Bekämpfung der durch *Pseudomonas medicaginis* var. *phaseolicola* Burkh. verursachten Fettfleckenkrankheit der Bohne. (**Contributions to the problem of the control of the grease spot disease of the bean caused by *P. medicaginis* var. *phaseolicola*).**
Angew. Bot. 1942 : **24** : 31–61.

The difficulty of obtaining a sufficiently large number of bean varieties resistant to grease spot disease for German requirements is stressed. In view of the desirability of promoting the cultivation only of resistant varieties and of the fact that (1) the relevant literature covers merely a part of the wealth of the existing collection of beans and (2) the varieties differ in

their reaction under artificial infection and under conditions in the open field, investigations were begun by the author in 1931 dealing to a large extent with varietal differences in susceptibility in beans. A special report on the results with particular reference to the variety question is to be issued later.
The present paper deals *inter alia* with field observations on, and determinations of the amount of, infection in different varieties raised from seed supplied by breeders, as well as with methods of controlling the disease.

369. Andrus, C. F. 635.652–2.483:576.16:631.521.6:575.11
The factorial interpretation of anthracnose resistance in beans.
Tech. Bull. U.S. Dep. Agric. 1942 : No. 810 : Pp. 29.
The inheritance of resistance to three physiological forms (beta, gamma and delta) of *Colletotrichum lindemuthianum* was studied in 15 intravarietal crosses of *Phaseolus vulgaris*. Parent varieties were resistant, tolerant or susceptible.
The simplest mendelian hypothesis that co-ordinated all the data for beta and gamma anthracnose was a system of 10 genes in 3 allelomorphic series involving both duplicate and complementary genes for resistance, one dominant gene for susceptibility and gene interactions at 3 points. For the explanation of the inheritance of resistance to the delta form 3 independent pairs of genes sufficed.
Linkage was observed in one cross between red seed colour and suspectibility to beta and gamma anthracnose. E. K. J.

370. Magruder, R. 635.653:575(73)
Preliminary observations on some of the newer varieties of bush lima beans.
Canner 1941 : **92** (12) : p. 58.
U.S. No. 2 is a selection from Henderson, and is slightly earlier. Baby Fordhook has smaller beans than Henderson but is better in quality. Early Baby Potato is a selection from Illinois Baby Potato and is earlier and better in flavour than Henderson. Maryland Thick Seeded matures with Henderson but is smaller and better in quality. Green Henderson resembles Henderson but the cotyledons are lighter green in colour, though not inferior in vitamin C content.

371. Magruder, R. and
Wester, R. E. 635.653:581.162.32
Prevention of field hybridization in the lima bean.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : 413–14.
A thin 28/20 mesh cotton plant-bed cover material, 6 feet wide was used to cover the row of plants and was applied just before the plants started to bloom.

372. Magruder, R. and
Wester, R. E. 635.653:581.45:575.11.061.6
Inheritance of green cotyledon in the lima bean.
Proc. Amer. Soc. Hort. Sci. 1942 : **40** : p. 410. (Abst.).
This work will be published in detail in the Journal of Agricultural Research.

373. Cartter, J. L. and
Hopper, T. H. 635.655:581.48:575"793"
Influence of variety, environment, and fertility level on the chemical composition of soybean seed.
Tech. Bull. U.S. Dep. Agric. 1942 : No. 787 : Pp. 66.
The varieties have been selected to include early and late types in order to study the effect of ripening at different periods on seed composition. With the exception of Peking, all are yellow seeded. The varieties have been described by Morse and Cartter (U.S. Dep. Agric., Fmrs' Bull. 1939, No. 1520) who record the relative maturity ranking of the varieties. The present bulletin includes a map showing the position of six experiment stations where the soya bean varieties have been grown for the study of the effect of location and season on composition of soya bean seed.

374. SINGLETARY, B. H. 635.656:575.127.2
The Singletary pea . . . a versatile legume.
Sth Seedsman 1942 : **5** : No. 9 : 9, 29, 36.
Describes the Singletary pea, its supposed origin as a hybrid between a sweet pea and a wild pea, and its value as a disease resistant winter legume crop in Louisiana. E. K. J.

375. ROSEN, G. VON 635.656:575.243:537.531
Röntgeninduzierte Mutationen bei *Pisum sativum.* (**Mutations in *P. sativum* induced by X-rays).**
Hereditas, Lund 1942 : **28** : 313–38.
The three lines employed had been multiplied for a number of years without giving any spontaneous mutations. The plants from irradiated seeds of the variety Acacia (X-generation) were somewhat smaller; the germination percentage, the number of seeds per pod and the number of plants that flowered were in inverse proportion to the *r* dose.
Similar treatments of the de Winton series produced no mutants, though dwarfing and other physiological anomalies were observed in the plants arising from the irradiated seeds, as in the Acacia series. The variety Uni produced a large number of mutants.
The 22 different mutations obtained were all simple recessives, all affecting the chlorophyll and all more or less lethal. The mutants and their genetical behaviour are described in detail; some of them proved to be chimaeras. All the mutants, with one exception, showed an unusually marked deficit of recessives in their progeny; there is thus a gradual selection against the mutants, acting probably in the gametes rather than in the zygotes. All the mutations seem to be macromutations.
These artificial mutations are compared with the spontaneous mutations in *Pisum* reported in the literature; *albina* forms are entirely absent in the artificial and very rare among the natural mutations, while the *chlorina* types are very common in both. Natural mutations however are not limited to chlorophyll effects.

376. HÅKANSSON, A. and
LEVAN, A. 635.656:576.312.315
Nucleolar conditions in *Pisum*.
Hereditas, Lund 1942 : **28** : 436–40.
Observations on 10 commercial strains of *P. sativum* and one form of *P. thebaicum*, using a differential nucleolar stain, have shown the presence of a nucleolus on each chromosome in the early phases of mitosis; later the small nucleoli fuse to form one or more large ones. At meiosis, though 1 dominating nucleolus is always present, 1 or 2 accessory nucleoli have sometimes been observed; all disappear at metaphase I, and at telaphase I each chromosome again forms a nucleolus, fusion taking place later as in mitosis. Extra-nuclear nucleoli frequently appear during interkinesis.

BOOK REVIEWS

KELSEY, H. and
DAYTON, W. A. (Editors) 001.4:582
Standardized plant names. Second edition. A revised and enlarged listing of approved scientific common names of plants and plant products in American commerce or use.
J. Horace McFarland Company, Harrisburg, Pa 1942 : $10.50. Pp. xv + 675.

This second edition of a book first published in 1923 and now very widely known, contains some 90,000 separate entries of plant and plant product names, more than twice as many as appeared in the first edition. In addition to this increase in scope, there are several important innovations. As a guide to the pronunciation of Latin names, an acute accent has been placed close to the main syllable stressed. Clones have in many cases been marked by a special symbol, and another symbol is used to mark "polybrids"—group hybrids which are genetically inconstant. A glossary is also added.

This book serves a valuable purpose in standardizing the names of horticultural varieties and other plants of economic importance. Standard equivalent common names are given for most of the Latin names, and no less than 8,000 of these are new names introduced by the Editors. With regard to the Latin names themselves, the International Rules of Botanical Nomenclature are now followed, with two main innovations. These are (i) the disuse of capital initials for all species and botanical varieties, a practice which the editors think will in due course become universal, and (ii) double "ii" endings of species names are changed to "i". S. E.

5(71)
TORY, H. M. (Editor) 58(71)
A history of science in Canada.
The Ryerson Press, Toronto 1939 : $2.50. Pp. vi + 152. illus.

When the American Association for the Advancement of Science met in Ottawa in 1938, a series of papers reviewing the history of Canadian science were prepared by different scientists for the meeting. These are now brought together in the form of the book before us. The sciences covered are geology, chemistry, botany, zoology, medicine, astronomy, mathematics and physics.

Readers of "Plant Breeding Abstracts" will find the contribution on botany by Frère Marie-Victorin disappointing as an account of the part Canadian botanists have played in the development of agriculture and of the international importance of their work. J. L. F.

5:061:058(73)
6:061:058(73)
Latin American Scientific Societies and Institutions.
Pan American Sanitary Bureau, Washington, D.C., 1942 : No. 141 : Pp. 146. (Mimeographed).

This directory, issued by the Pan-American Sanitary Bureau, provides a list of S. American scientific societies and institutions classified first by subject and secondly alphabetically by countries. A table of contents gives the subject headings and an index supplies a key to the more specialized aspects of these subjects.

Dates of foundations of the societies or institutions are given, where known, and the term of office of officers is indicated by a date in parenthesis after their names. In instances where recent officers could not be traced the name of a member of the society care of whom correspondence may be addressed is given—a most useful feature of the directory.

The official organs of societies and institutions have been listed where possible.

The introductory explanatory note, the subject headings and the index are reproduced in English, Spanish, Portuguese and French.

Corrections and additions will be welcomed by the Sanitary Bureau.

This well planned directory should be of value to medical or general scientific libraries and information bureaux.

The subjects included, though heavily weighted on the medical side, also comprise some

information on Biology, Botany, General Sciences, Entomology, Geography and Radiology, which should be of interest to botanists and biologists and possibly agricultural workers. Though the volume is neo-styled it should be well worth binding; for the paper is good and the print clear and well spaced, thus providing room for any additions that may need to be added from time to time.

TRELOAR, A. E. 519.24
Random sampling distributions.
Burgess Publishing Company, Minneapolis, Minn. 1942: $2.25. Pp. 94. 24 figs. (Mimeographed).

The experimental scientist is frequently faced with the problem of interpreting a short series of observations by the method of statistics. In general he will have insufficient knowledge of mathematics to follow the deduction of the methods he finds it necessary to use. One course open to him is to use the technique of making statistical tests without understanding the reasons why.

The author of the book under review objects to this course, and shows that the geometric method, which cannot in general give the definitive equations of random sampling distributions, can be effectively used to describe the properties of the distributions which enable them to be of use for the interpretation of data.

After a chapter on the basis of statistical inference, he deals with the random sampling distribution of means and differences between means, emphasis being placed on the approach to normality of the distribution of the mean of a sample from a non-normal population with increasing size of the sample. The next three chapters deal with the sampling errors of the standard deviation and the comparison of standard deviations by Fisher's "z" distribution. There follow chapters on Student's distribution and its use, the analysis of variance, the sampling errors of the correlation coefficients and the testing of regressions.

It is felt that less space could have been spent on the distribution of means etc. and more, for example, on the analysis of variances. The diagrams which illustrate the derivation of the distributions are, in general, very clear.

A short inadequate description of estimation by the Method of Maximum Likelihood is given, and the special advantages of this method are slurred over. O. K.

HAYES, H. K. and
IMMER, F. R. 575:633
Methods of plant breeding.
McGraw-Hill Publishing Company, Ltd., London, 1942: 28s. Pp. xii + 432. 89 tables. 37 figs.

The purpose of this manual is "to summarize the methods of breeding that have been developed for particular categories of crop plants, to explain the reason why particular methods are chosen for certain types of crop-improvement problems, and to give methods of field-plot technic and of statistical analysis that are adapted for particular uses". The authors start by answering that oft repeated question: "What has plant breeding done for the practical grower?" The answer is given in the form of practical illustrations, such as the production of spring wheat resistant to stem rust, of hybrid corn and of potatoes resistant to late blight, virus, scab and insect pests. Emphasis is placed on the necessity for cytological studies in plant breeding and the direct application of many cytological and genetical phenomena to practical breeding work is illustrated by several concrete examples.

Special sections are devoted to the effects of self-pollination in different groups of plants and to heterosis and the various hypotheses put forward to explain it. Different methods of breeding are applied according to the varying methods of reproduction of the plant dealt with and these are described separately. Plant introduction is rightly included as an integral and highly important part of plant breeding. No attempt is made to conceal the complexity of plant breeding problems and the value of co-operative work is well illustrated by the production of smooth-awned and other improved barleys by the joint efforts of plant geneticists, plant pathologists and cereal technologists in Minnesota.

The back-cross method receives special attention in a separate chapter; several practical

illustrations of its value are given, including an account of the production of bunt-resistant wheat, containing certain hitherto unpublished information supplied by Dr. F. N. Briggs.
Other topics to which special chapters are devoted are breeding for disease and insect resistant, inheritance in wheat, in oats, in barley, in flax and in maize, methods of maize breeding, methods of selection for special characters, such as quality, resistances, content of various chemical constituents, etc., methods of controlled pollinations (breeding of cross-pollinated plants) and seed production.
The last 100 pages are devoted to an outline of the main statistical methods used by plant breeders in the interpretation of their results, etc., a number of useful tables selected from the works of Snedecor and Fisher being reproduced in an appendix.
The book is of the usual high standard associated with the McGraw-Hill Co.; there is an index, a glossary and a copious bibliography. The only criticism is that the particular method of presentation chosen by the authors, consisting in treating the principles and the objects of breeding separately, leads to considerable redundancy and lack of continuity.

575.17
DEMEREC, M. et al. 576.312.34
Cytology, genetics and evolution.
University of Pennsylvania Press, Philadelphia 1941 : $2.00. Pp. v + 168. 9 figs. tables.

This symposium includes several papers that will be of interest to the plant breeder, notably the following:
The Nature of the Gene (M. Demerec), a study based principally on studies of *Drosophila* salivary gland chromosomes, in which it is pointed out that there is a sensitive region on each side of a gene which, if broken, frequently affects the action of the gene. The length of the sensitive region varies with the locus and with the nature of the recipient section in a translocation; it tends to be longer if this section is heterochromatin.
Chromosome Structure (C. W. Metz). The author puts forward the view that the chromosome consists of intimately mixed genic and non-genic material, and not a chain of genes surrounded by a thick sheath or matrix. He considers that the number of molecules at one locus is likely to be large and variable.
Chromosomal Interchanges (A. F. Blakeslee). An historical account of the work on *Datura*.
Evolution of the Germplasm (C. E. McClung).
The Physico-chemical Properties of the Nucleus (L. Churney).
Radiation and the Cell Nucleus (P. S. Henshaw). S. E.

HUXLEY, J. 576.12:575.42:575.1
Evolution, the modern synthesis.
George Allen and Unwin, Ltd., London 1942 : 25s. Pp. 645. tables.

This book is based on a series of lectures given in 1936 to the British Association on "Natural Selection and Evolutionary Progress". It is, however, much more than this since its 645 pages contain a wealth of information on all lines of modern genetical, cytological and taxonomic study that help to throw more light on the process of evolution. In particular the valuable work of R. A. Fisher is stressed in showing how the effect of a mutation can be altered by new combinations and mutations of other genes. The author states that any originality that his book may possess lies in attempting to generalize this idea and in stressing the need for the study of the effects of genes during development. Equally original is the presentation and analysis of a vast quantity of taxonomic data in the light of modern genetical and evolutionary theories.
The presentation of the latest ideas on the species problem, geographical, ecological and genetical speciation, evolutionary trends and evolutionary progress is of value to workers in every branch of biology.
In the last chapter on evolutionary progress the author deals not only with evolutionary processes in plants and animals; he also applies this to man, realizing at the same time that the methods of evolutionary change, varying as they do for species with different modes of life and of differing degree of complexity, must with man be capable of conscious control; in man for the first time purposeful evolution is at least a possibility.
The book ends with a large and useful list of references of 35 pages and is well indexed.
J. G. H.

HYLANDER, C. J. and
STANLEY, O. B. 581
Plants and man.
The Blakiston Company, Philadelphia 1941 : $3.00. Pp. x + 518. 308 figs.

This botany textbook is not designed as a preparation for later specialization in the subject as are most such books; instead, the aim of the authors has been to interest the general student, and the book is regarded as an end in itself rather than as a stepping stone to further studies. The field covered is enormous, the aim throughout being to study plants as they influence man's activities. No time is spent on purely technical branches of botany, which are of no direct importance or interest to the general student.

Part One of the book is an introduction which gives the student some idea of the variety of plant life and of the increase of complexity and specialization, both in structure and in mode of reproduction, as one passes up the scale from unicellular organisms to angiosperms. Parts Two to Six, forming the bulk of the text, relate to plants of economic importance, their botany and utilization. In addition to botanical information, one finds brief details of such technical processes as the manufacture of paper pulp, the distillation of wood, and the extraction and refining of sugar from cane and beet. The last two Parts deal with Plants as Parasites (chapters on Bacteria and Diseases, and Fungi and Plant Disease), and The Enjoyment of Plant Life (notes on American wild flowers and ornamental plants).

The book is illustrated with many diagrams and photographs, most of them good. The review found the mode of presentation extremely interesting and the text factually reliable. It seems that the authors' intentions have been well carried out. S. E.

HARKNESS, D. A. E. 63(41)
War and British agriculture.
P. S. King and Son, Ltd., London 1941 : 7s. 6d. Pp. 109.

The author takes as his starting-point the trend towards livestock production, clearly evident before 1914. After discussing the expansion of British agriculture in the latter half of the last war and the policy and changes in the period between that and the present war, he goes on to discuss policy and changes in this war and finally the problem of the post-war period. The plough-up policy is shown to be an essential war-time measure for increasing the volume and the versatility of food production. Equally clearly it is shown that livestock policy remains the central and decisive point of war-time agricultural policy. At present a great part of the increased arable acreage would appear to be used for feeding animals, while, the author points out, in the national interest there are important advantages in using it for feeding human beings directly. The decision to do so, once put into effect cannot be reversed during the war, for its means reducing the livestock population.

The author's post-war policy is perhaps the most interesting part of the book and deserves careful study, especially to consider whether it is compatible with the application of the principles of the Atlantic Charter. J. L. F.

HANDY, E. S. C. 631.524:633(96.9)
The Hawaiian Planter—Volume I, his plants, methods and areas of cultivation.
Bernice P. Bishop Museum, Honolulu, Hawaii, 1940 : Bull. 161 : Pp. iii + 227. 5 tables. 8 plates. 21 figs.

This is an ethnologist's study of the cultivated plants introduced by the Hawaiians into their agriculture before the discovery of the islands by Europeans. It describes indigenous horticultural methods and the extent to which the islands utilized their resources of soil and water. Detailed descriptions are given of the methods of planting followed and of the many varieties of taro (*Colocasia esculentum*) and sweet potato (*Ipomea batatas*) grown in the different islands. Other plants treated though not so exhaustively are bananas, bread fruit, sugar cane, paper mulberry, pineapple, coconut, gourds, turmeric and awa (*Piper methysticum*). The book is a veritable mine of information about the part played by these and other plants in Hawaiian life. It should be of value not only to those interested in Polynesian culture but to those who wish to utilize and conserve systematically the knowledge of indigenous agriculturists who have

dwelt with their native soils and plants through millenia. That the Polynesians are skilled, ingenious and intelligent farmers is amply proved by study of their horticulture as presented in this monograph. The book is illustrated and provided with a glossary of Hawaiian terms and names. E. K. J.

HOLTON, C. S. and
HEALD, F. D. 632.451.3
Bunt or stinking smut of wheat. (A world problem).
Burgess Publishing Company, Minneapolis, Minn. 1941 : $3.25.
Pp. ii + 211. 21 figs. tables. (Mimeographed).

The monographs in mimeographed form issued by the Burgess Publishing Company have set a high standard of usefulness and the present contribution on bunt well maintains that standard. The extensive international literature on bunt is concisely reviewed in eleven chapters covering all aspects of the problem. Only in regard to seed treatment do the authors, unwillingly, give up the attempt to cover all the literature, pointing out that at one period papers on this topic were appearing at the rate of one every nine days. Physiological specialization, cytology, heterothallism, interspecific hybridization and inheritance in the two *Tilletia* species are reviewed and also varietal resistance and its inheritance. The quality of the illustrations is surprisingly good. There is no index. The treatment of the different aspects is necessarily brief, but the choice of sources for further information is embarrassingly rich.
J. L. F.

WILLIAMS, R. O. and
WILLIAMS, R. O. (jun.) 633:582(72.98)
Revised third edition of the useful and ornamental plants in Trinidad and Tobago.
A. L. Rhodes, M.B.E., Government Printer, Trinidad and Tobago 1941 : $1.00.
Pp. 265.

The colony of Trinidad and Tobago possesses many wild plants, some of economic value and some ornamental. These have been supplemented by extensive introductions. In the third edition of this manual a list is given of the plants according to their uses, followed by descriptions of the species arranged alphabetically according to their Latin names, with cross-references from their popular names; there is an alphabetical list of families and genera and the volume closes with some notes on cultivation for the benefit of those who are anxious to grow more food for home consumption. There are only a few minor criticisms—e.g. Satsuma appears under both *Citrus nobilis* and *C. sinensis*.

WICKIZER, V. D. and
BENNETT, M. K. 633.18(5)
The rice economy of Monsoon Asia.
Food Research Institute, Stanford University, California 1941 : $3.50.
Pp. xiii + 358. 9 maps. 21 charts. tables.

A wealth of information exists on the economic aspects of wheat, no small contribution having been made by the Food Research Institute, Stanford University. Relative to its world importance much less information is available on rice. Based to a large extent on studies made in the Far East by the late C. L. Arlsberg and by V. D. Wickizer, the book before us should therefore be in considerable demand.

After dealing with the geographical and agricultural aspects, the authors describe the marketing and milling and the export and import markets. The position of rice in Asiatic diets is then studied, followed by a chapter on prices and one on governmental intervention. Consumption trends since 1920 are next considered and it is shown that in certain countries *per capita* consumption is declining. The possibilities of increasing rice production are considered under the headings, yield and acreage and finally the authors discuss future trends. In an appendix statistical data in the form of tables and notes are provided. The book is illustrated by charts and maps and is concluded by an index.

A brief section deals with the importance of selection in improving yields. The rather depressing conclusion is that "with few exceptions, yields have not been greatly improved during recent decades, and that the potentialities would seem to be much greater than the results thus far achieved". J. L. F.

ZAND, S. J. 633.513
Kapok—a survey of its history, cultivation and uses with special consideration of its application to thermal and acoustical treatments.
British Chamber of Commerce for the Netherlands East Indies, London and Java 1941 : Pp. vi + 119. illus.

The qualities of kapok fibre which make it suitable for such widely different uses are its springiness in mattresses, etc., its buoyancy in, and resistance to penetration by water its insulating properties against heat and its high absorption of sound. While it is not easily spun, being a straight and smooth fibre, this difficulty has been at least partially overcome, with a resulting increase in its potential uses.

The author, an engineer, has performed a useful service to economic botany, by bringing together in this book information on all aspects of kapok, botanical, agricultural, industrial and commercial. The book is handsomely produced, illustrated and provided with a bibliography. J. L. F.

FAES, H. 634.8:030.8
Lexique viti-vinicole international Français-Italien, Espagnol-Allemand. (**International French-Italian, Spanish-German lexicon of viticulture and wine-production**).
Office International du Vin, Paris 1940 : Pp. 278.

Owing to the difficulty frequently encountered among viticulturists and wine producers of different countries in interpreting foreign technical terms used in their industry, the preparation of a lexicon that would give the exact equivalents in various languages was undertaken by the International Office for the Wine Industry (l'Office International du Vin). The aim was to produce a dictionary in French, Italian, Spanish and German that would be of practical use to the viticulturist, the technical expert and the wine producer.

The object has been highly successfully achieved in a compact and excellently produced little volume of convenient size. The contents are divided into four sections according to the linguistic group and the searcher under any one of these groups will find the definition in the particular language of the group and the equivalents in the other three languages where such equivalents exist.

It is to be hoped that this dictionary will find its way into the shelves of many public and private libraries. For the translator or abstractor and for the commercial representatives of wine firms, etc., it should prove invaluable.

In response to the editor's request, only one suggestion need be made here for future editions, namely, that on the blue page that serves to divide off the separate languages, the four languages should be enumerated in their respective order of occurrence in the four different sections.

BALDWIN, H. I. 634.97:581.48
Forest tree seed of the north temperate regions with special reference to North America.
Chronica Botanica Company, Waltham, Mass., 1942 : $4.75. Pp. xvi+240. 28 figs.

The author starts by defining a seed and describing its typical structure and development. The various factors that influence seed production are considered in chapter II, where many interesting facts on periodicity are brought together; various artificial measures used to induce seeding are also outlined.

Under "Provenance" the author discusses the many factors, hereditary and non-hereditary, that may influence the seed and the trees that develop from it, and the literature on races of forest species is reviewed. Much useful information is given on seed collecting in the fourth chapter and on extraction and cleaning in the fifth.

A great deal of attention is given to germination and dormancy, leading to some rather irksome redundancy. Thus the various influences which affect seed viability on the one hand and germination on the other are analysed under the heading storage and longevity; the phenomena of dormancy and germination, and the factors that control them, are then discussed in separate chapters, and a later chapter entitled "Seed Stimulation" is devoted to artificial

means of hastening germination by cell stimulation; two later chapters deal with methods of determining viability without germination and of testing germination. Under "Chemistry" an account is given of the various storage products found in seeds and the changes they undergo during storage and germination.

The discussion of seed testing includes testing both for genetical or racial purity and for condition, purity and origin. The features which may serve to distinguish seeds of different origins are many and various and each is discussed separately, the test based on phototropic curvature of seedlings receiving special attention. Seed testing stations and certification are treated in a separate chapter. In a brief final chapter on Tree Seed Research a number of subjects that still await investigation are considered; chief among these are the control of flowering, the use of growth substances, and forest genetics and cytology, particularly cross-fertilization and induced polyploidy.

The volume ends with a glossary of tree seed terms, with French, German and Scandinavian equivalents, an index of plant and animal names and an author index. There is no subject index. Extensive bibliographies are appended to each chapter.

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